

# Let's Change the Future"

Race, Gender, and Equality in the Digital Age

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with

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Windows 10

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## VIDEO



### Serena Williams in Conversation

The tennis legend talks with WIRED about race and equality. Watch the athlete and entrepreneur discuss how far her sport has come, being a role model, and standing up for yourself and others.

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## WEB + PRINT

### The Future of Football

As Super Bowl 50 approaches, WIRED and Sports Illustrated have teamed up for a new series that examines what football will look like 50 years from now. Don't miss a play.

ON THE WEB: [WIRED.com/sb100](http://WIRED.com/sb100)

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## VIDEO

### Voices Against Online Harassment

Participants from our online harassment roundtable (page 108) share their own experiences and discuss what can be done to make the Internet a safe place for all (clockwise from top left: Chinyere Tutashinda, Del Harvey, Nadia Kayyali, Anil Dash).

ON THE WEB: [video.WIRED.com](http://video.WIRED.com)



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Hypothetical yield curve: A chart that plots the yields of similar bonds across different maturities. The yield, as of 8/14/15, for commonly referenced indices representing bonds with 1-5 year maturities, is as follows: U.S. Treasury securities (1.01%), Barclays 1-5 Year Municipal Bond Index (1.11%), Barclays 1-5 Year U.S. Credit Bond Index (2.05%), and Bank of America Merrill Lynch 1-5 Year BB/B Cash Pay Index (5.99%). Sources: Barclays Live, Bank of America Merrill Lynch.

<sup>1</sup>Interest rate sensitivity is based on the annualized standard deviation of monthly total returns for the 10-year period ending February 2014, with the overall bond market represented by the Barclays U.S. Credit Bond Index (all maturities), and short-term bonds represented by the subset of bonds within the index with maturities of 1-5 years (Barclays 1-5 Year U.S. Credit Bond Index). Source: FMR.

<sup>2</sup>Frequency of reinvestment based on the percentage of bonds maturing within 3 years as of 8/14/15 — 22.54% for the overall bond market (represented by Barclays U.S. Credit Bond Index), and 55.42% for short-term bonds (represented by Barclays 1-5 Year U.S. Credit Bond Index). Source: FMR.

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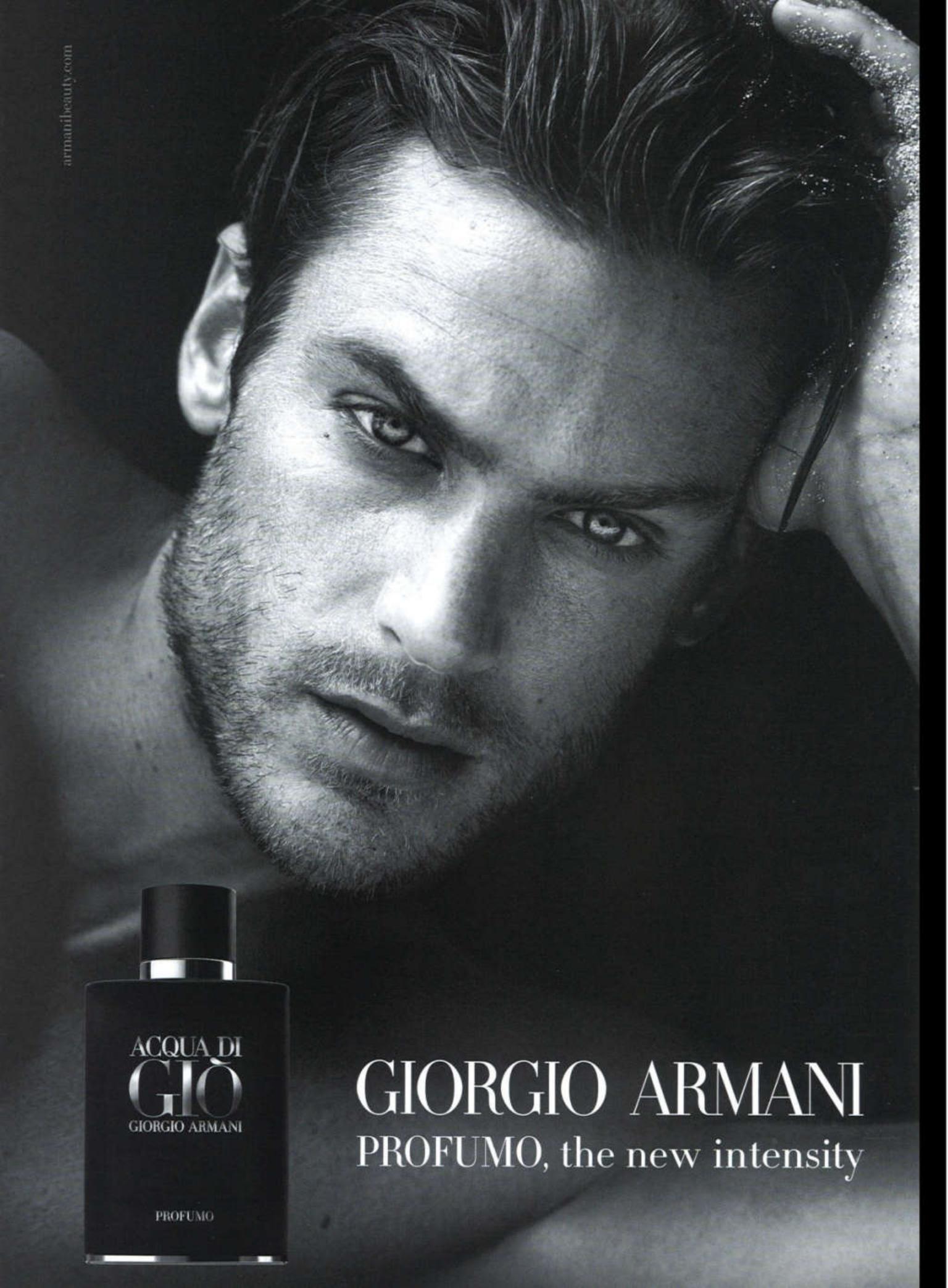
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## GAME ON

From Silicon Valley's stubborn diversity problem to Facebook COO Sheryl Sandberg's call to "lean in" to the digitally enabled nationwide rise of Black Lives Matter, the WIRED world is squarely at the heart of today's conversation about race and gender. ¶ So earlier this year, we decided to devote all of our attention to these important matters and dedicate an issue of WIRED to equality and the future—and we had the great good luck to have Serena Williams join us as guest editor. Because Williams isn't just a tennis champion and singularly great athlete; she's been a leader in the fight for equal representation and pay in her sport as well as being a passionate advocate for giving girls in Africa the same access to education as boys. With her help and guidance, we assembled a wide-ranging collection of stories this month, from a piece about the science fiction community to an exploration of how technology platforms shape today's social justice movements to a roundtable on online harassment. ¶ Williams opened the door to an incredible range of contributors. Their perspectives make this magazine more than just a rehashing of what we already know. We cover a changing world, after all, and nowhere are these changes more apparent than in their stories and ideas. ¶ As you may have noticed, WIRED has been ramping up its coverage of these issues for a while. (And we walk the walk: Year to date, seven of our 11 covers have featured women or people of color, for example.) But the change we all hope to see in the world—toward justice, toward inclusion—isn't an easy one. Which, if you'll allow me a moment of journalistic avidity, is what makes it a great story. That's why this issue isn't the end of our efforts to understand and embody inclusiveness and equity. We've only just begun.

SCOTT DADICH  
Editor in Chief  
 @SDADICH



COVERS OF WIRED  
HAVE FEATURED WOMEN  
OR PEOPLE OF  
COLOR IN 2015.

## CONTRIBUTORS



**Kimberly Bryant** is the founder of Black Girls Code, a nonprofit in San Francisco that teaches girls of color to code and design games.



**Common** played James Bevel in the 2014 film *Selma*. The rapper also cowrote and performed the film's Oscar-winning song, "Glory."



**Billie Jean King**, once the world's highest-ranked woman in tennis, was one of the first openly gay major American athletes.



**DeRay Mckesson** is a former school administrator and probably the most recognizable face of the new online civil rights movement.



**Adria Richards** is a DevOps engineer who became the target of an online mob in 2013. She works on software that reduces online harassment.



**Anne-Marie Slaughter**, CEO of the New America foundation, wrote the blockbuster *Atlantic* cover story "Why Women Still Can't Have It All."



**Bijan Stephen** is an associate editor at the *New Republic* and an active voice on social media who writes frequently about race.



**Tristan Walker**, CEO of Walker & Company, has been called the "highest-profile African-American startup founder" in Silicon Valley.



**Amy Wallace** is a veteran magazine writer. She collaborated with Pixar and Disney president Ed Catmull on his book *Creativity, Inc.*



**Jen Welter** is a former professional player in the Women's Football Alliance and the first woman to coach in the NFL.

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## BACK TO SCHOOL

Snoop Dogg, Tupac, Dr. Dre, Nine Inch Nails, Marilyn Manson, Eminem: If it weren't for Jimmy Iovine, you might not know those names. Oh, and those ubiquitous Beats headphones? That was Iovine too. Now the legendary producer (and head of Apple Music) wants to do something even grander: save the music industry. As September's cover story ("Relentless") reported, Iovine and Dre have teamed up to found an undergraduate program at USC for training the next generation of leaders. Their hope is to assemble "a pipeline of professionals, equally at home in the worlds of tech and culture," Jason Tanz wrote. If they succeed, it won't just mean a bunch of new creative talent—it could change the way we think about education.

Re: "Relentless"

## "CAN DRE AND IOVINE TEACH THE NEXT GENERATION HOW TO GET PAID?"

Ken Gordon on Facebook



Re: The New Cultural Literacy: What and Who You Need to Know in 2016

"Great list. Don't know if I'll get through it by 2016. I may have to shoot for 2017."

John Dietrich (@ampyourgrowth) on Twitter

"What a pleasant surprise to be able to show my 8-year-old daughter all the women featured in the New Cultural Literacy package—though a few more women on covers would be nice."

Brian Turner via email

Hope she enjoys this issue!  
—The editors

Re: "Relentless":  
Jimmy Iovine and Dr. Dre Are Training the Creators of Tomorrow  
"Pretty lofty ambitions from Iovine, but no more so than his previous successes and failures. The idea of blending tech, business, and arts into one curriculum should be an option at every college. People need to be taught how to run a business, how to be an effective leader, how to research, and how to develop their own creations."

Tim Mackey on Facebook

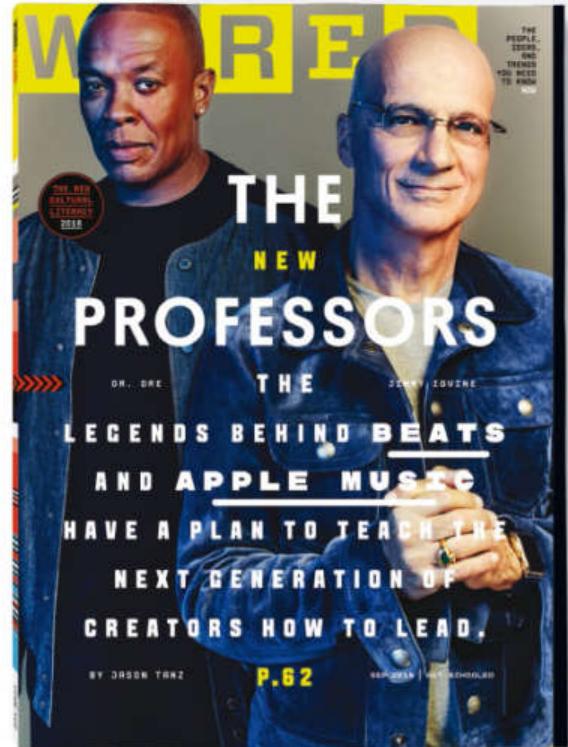
"The ways in which people consume music and encounter new songs and artists have changed radically in the past two decades, but the ways in which the music industry has addressed this

have fallen short. Whether or not these are the people to effect change, I can't say. But someone's going to do it."

Andrew Purvis on WIRED.com

"The music industry doesn't need saving. In the cities I frequent—New York, New Orleans, Philly—there seems to be more live music than ever. Festivals all over the country are packed with fans. There also seems to be more new music released. Streaming is definitely not the answer. Nor do I need pop stars whom I can't stand telling me what to listen to. 'Curating' playlists and radio stations? What a joke."

Jjazznola on WIRED.com





**Re: "Attention, Humanity!": Louis Psihogios Exposes Environmental Destruction in *Racing Extinction***

**Interesting article, but what got my attention was Psihogios' anecdote about being too embarrassed to scream in a crowd. We should never be afraid to scream for what's right. And we should all find something worth screaming about.**

Colleen Marble via email

**"I applaud the work of Louis Psihogios and other investigative**

**reporters who are exposing the wrongs of the world.**

***The Cove* was a shocking exposé of a hidden business; I expect the same of *Racing Extinction*. At the same time, it's easy to vilify others to feel better about ourselves. We may not kill sharks for fin soup, but what else are we doing that is equally destructive to our planet? The US is a powerful nation, and our behavior sets an example for the world."**

Beau Riedel via email

**Re: Mr. Know-It-All on Not Tipping**

**"Tipping drives quality in many, but not all, instances. That's my tip/no-tip decision equation. Just because there's a tip jar or button doesn't mean it's warranted."**

Singulatarian on WIRED.com

**"Everything has a tip line or a tip jar or a tip button. Just because it's there, don't feel guilty not engaging in the practice. At my coffee shop, I pay with credit card and I choose no tip. I don't tip the person at my drugstore. Nobody tips me at my desk at work."**

Two Piece and Biscuit on WIRED.com



**"Have cash, will tip."**  
Wruff Truff Fruff on WIRED.com

**Re: What's Inside: Mr. Clean Magic Eraser**

**"It's not magic. It's chemistry."**

Andy Schaul (@andyschaul) on Twitter

**"This piece is irresponsible. You say it contains formaldehyde, but the manufacturer is clearly on record stating that it never has and never will contain formaldehyde. Tell your fact-checkers to look it up."**

Desmond Mullen via email

Researcher Timothy Lesle responds: "Magic Eraser does not contain pure formaldehyde. And that's surely what Procter & Gamble, Mr. Clean's parent company, wants to make clear to consumers. But BASF, the product's manufacturer, does use formaldehyde to produce formaldehyde-melamine-sodium bisulfite copolymer. It's not so unusual (it's also used in tableware) or unsafe (as the article says, the reaction neutralizes the toxic effects of formaldehyde). Now, melamine resins can emit formaldehyde in certain circumstances. It's likely that both Procter & Gamble and BASF make sure the formulation minimizes this possibility, but neither company responded to our questions."



**Re: "Table to Earth": The Perennial Sends Leftovers Back to the Farm**

**"Silicon Valley: where you can prototype bread."**

JackPham  
(@jackpham) on Twitter

**Re: Readability**  
**"What a concept: Text that can be distinguished from the background! Keep this up and those of us who are**

**older might even be able to read your magazine."**

Robert Warner  
via email

**UNDO**

**"Science: Feeds" (issue 23.09) misspelled Leonid Kruglyak's name. The NFL, not Bose, required that NFL players stop wearing Beats headphones on camera ("Relentless," issue 23.09).**



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ARGUMENT

# THE ELECTION RECYCLE CAMPAIGN TECH NEEDS R&D, NOT CONSTANT DO-OVERS

BY ISSIE LAPOWSKY

ALPHA

BY ISSIE LAPOWSKY

IT WAS LATE November 2008, and Dan Wagner's post-Election Day high was wearing off. Just a few weeks before, the Obama for America team had gotten their guy elected, and people like Wagner, a member of the analytics staff, were getting a whole lot of credit. Headlines hailed Obama's campaign as the most digital-savvy in history. For Wagner, winning felt good. ¶ But weeks after the Election Day rush, as Wagner was lying in bed in Michigan, a crushing realization hit him: Every tool he had built, every algorithm he had written, all the work he had done was about to spend the





next three years rotting at the bottom of a code base in Chicago.

"It was pretty brutal," Wagner says. "The incredible contribution that dozens of engineers and analysts made was just lost overnight."

Wagner was not the first staffer to feel that pang of loss. Every four years, some of the brightest minds in public policy and technology put their lives on hold and work with a maniacal focus rarely seen outside Silicon Valley. Then, after the election, they all pack up and go home, leaving behind whatever innovations they had managed to build. "It's almost like resetting to zero every cycle," says Zac Moffatt, who worked as Mitt Romney's digital director in 2012.

Politics, in essence, has a research and development problem. It's the reason the political world is woefully behind in terms of technology adoption. Abandoning election-cycle innovations wastes valuable assets, staffer time, and donor funds. This wastefulness is so much a part of the political process, you could almost call it an American tradition. But the US has another tradition: startups. If politicians and parties don't want to start from behind every time, they need to preserve their work each election cycle, and startups are the way to do it.

**BY 2012**, Wagner was back on the campaign trail, this time as chief analytics officer for President Obama's reelection campaign. The day after the election—another victory for Wagner and his 54-person team of data crunchers—Google chair Eric Schmidt, a campaign adviser and donor, met with Wagner to talk about his work.

## TO PRESERVE THEIR WORK, POLITICAL PARTIES NEED STARTUPS.

Wagner remembers he was suffering from "a bad headache and a bad haircut" that day, as well as an ear infection he'd neglected for a couple of weeks that gave him such terrible vertigo he would intermittently topple over. Future plans were not on Wagner's radar.

But they were, unsurprisingly, on Schmidt's. Wagner says Schmidt told him he heard about what happened in 2008 and asked what he could do to ensure it wouldn't happen again. The answer they came up with was Civis Analytics, the Chicago-based startup Wagner founded just months later. Backed by Schmidt, it still employs one-third of Obama's data team.

The thinking was that if Wagner and company could keep the team together even though the campaign was over, they could hone their targeting and prediction skills with new clients in new industries, so by the time 2016 rolled around, the technology would be even more sophis-

ticated for the next batch of Democratic candidates. These campaigns, Wagner believes, "should be able to stand on the innovations of others and devote their time to the science of winning, not the science of database infrastructure, which is something that, frankly, we've already figured out for them."

Wagner is not the only one taking this approach, according to Daniel Kreiss, a professor at the University of North Carolina-Chapel Hill and author of the forthcoming *Prototype Politics*, an examination of innovation in politics. He says the 2012 election cycle launched a wave of new startups on both sides of the aisle. And that's a good thing, because it's precisely what both parties desperately need. "These firms are really important," Kreiss says. "They take tools and technologies and can institutionalize them."

**THERE'S ALREADY** ample evidence this strategy works. It was his party losing the 2004 election to George W. Bush that inspired former Democratic National Committee chair Howard Dean to make technology and grassroots organizing a priority for the party. This era saw the formation of left-leaning companies like Blue State Digital, a strategy firm founded by former Dean staffer Joe Rospars, as well as Voter Action Network, a database software company that grew out of two Iowa Democratic campaigns. By the time the next presidential election rolled around in 2008, they were already up and running. Today, they're pillars of the party.

During off-cycles, companies like Blue State can keep fine-tuning the same fund-raising and outreach tools they built, but

---

Staff writer  
**Issie Lapowsky**  
(@issielapowsky)  
is leading WIRED's  
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coverage.

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with clients from the for-profit and nonprofit sectors. "They're evolving them with their feature requests and innovation, so it's not stop-and-start," says Rospars, CEO of Blue State Digital and Obama's chief digital strategist in 2008 and 2012.

Democrats got a head start on this process, Kreiss says, but Republican ventures are also popping up. After Romney lost the 2012 election, for instance, Moffatt bulked up his own digital strategy firm, Targeted Victory, which focuses on advertising and marketing tech. Meanwhile, Alex Lundry, Romney's director of data science, launched Deep Root Analytics, which is similar to Civis, only more media-focused and on the other side of the aisle.



**BUT NOT ALL campaign tools** can stand alone within startups. Even the most sophisticated voter data registries aren't very relevant outside the political world. In order for all this to work, groups like the Democratic and Republican national committees have to invest in R&D alongside these startups. The way the parties conceive of their roles has to evolve, says Michael Slaby, who led Obama's tech teams in 2008 and 2012. "That means seeing tech infra-

structure as an important part of party building."

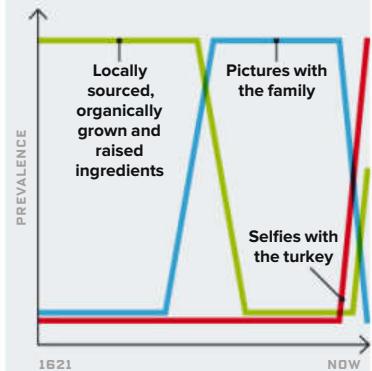
To some extent, that's already happening. Since 2012, the RNC has prioritized technology as a key to growing the party, even establishing its own data startup, Para Bellum Labs. Last year, the DNC launched an initiative called Project Ivy, which helps Democratic candidates benefit from technology developed during presidential cycles.

It can be tough to calculate the exact cost of wasting so much innovation. Sure, you could add up every campaign's technology budget and time spent through the years. But even that number wouldn't get at the true cost.

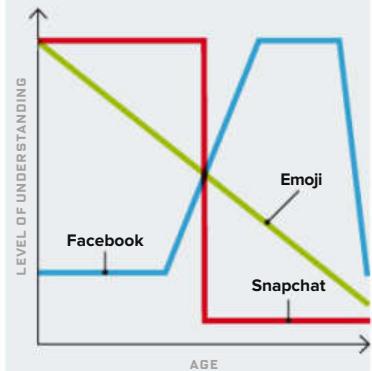
That's because the tools in danger of getting left behind are about more than finding Amazon users who just ran out of paper towels. They're about wading through seas of voter data to find people who might be swayed through a banner ad, a nifty donation tool, or a targeted TV spot—to turn out to vote, to get involved in the political process, to help elect the next leader of the free world. Ensuring these tools don't go to waste isn't just about making political campaigns more efficient. It's about making sure democracy works better for everyone. **W**



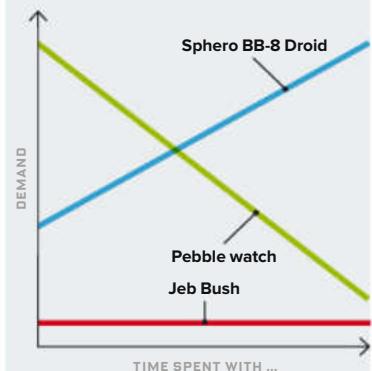
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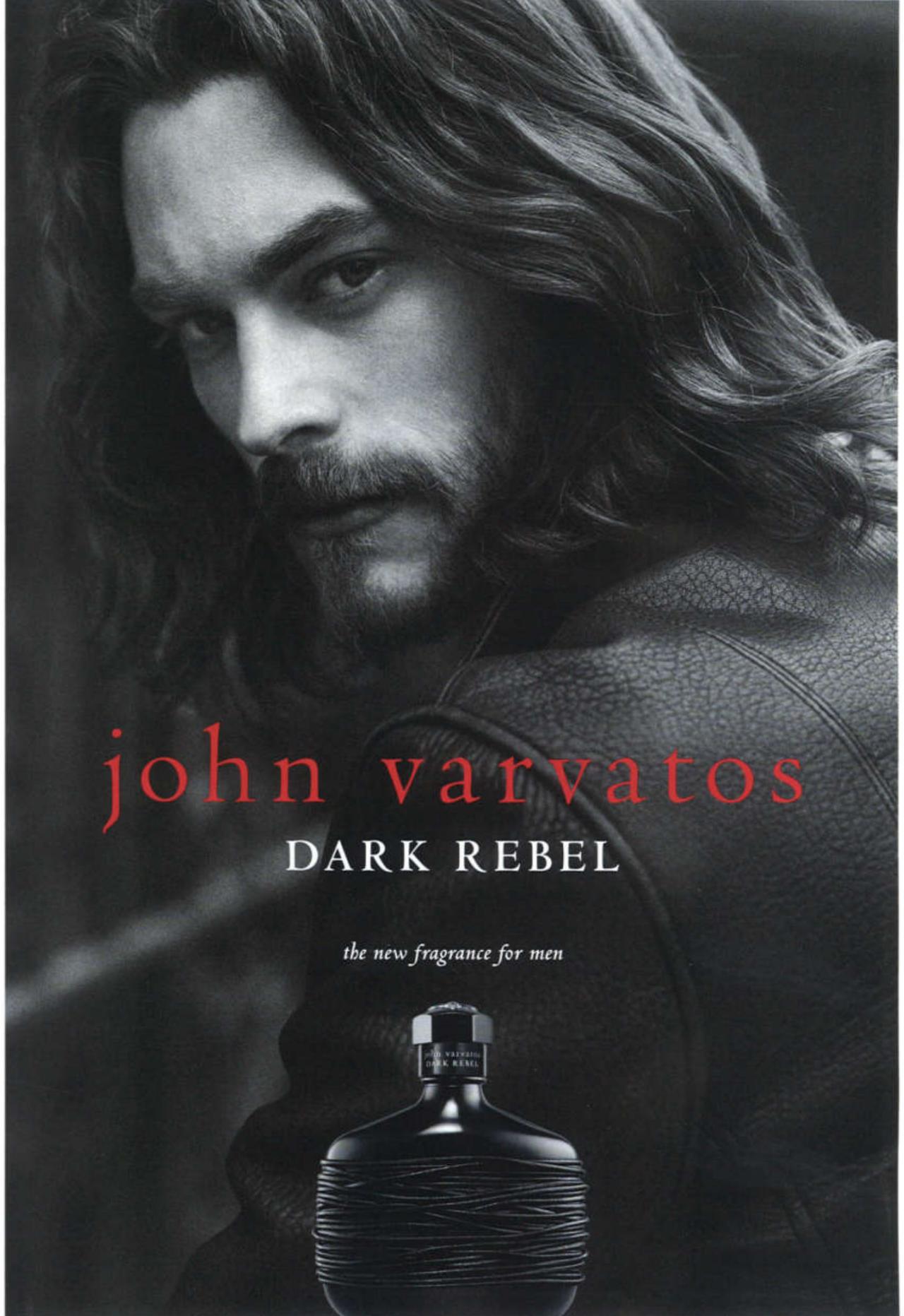


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AS A DIRECTOR of photography at Pixar, Sharon Calahan makes it her business to know environments. So when her director on *The Good Dinosaur*, Peter Sohn, said he wanted the movie to have a rugged, pioneer feel, Calahan knew just the place: Jackson, Wyoming, where she'd spent time painting landscapes. She took the crew there on a scouting trip so they could soak up

the region's treacherous terrain, harsh weather, and big sky. *The Good Dinosaur*, out in November, represented a unique stylistic challenge for Calahan. Unlike her previous projects at Pixar—as varied as *Ratatouille* (“soft and warm and romantic,” she says) and *Cars 2* (“a guys’ film with shiny metal”)—this story of a lonely apatosaurus and his little human friend takes place entirely

outdoors. That meant Calahan, one of the rare DPs whose entire body of work is computer-generated, had to pay extra close attention to lighting; much like her counterparts would in live action, she worked to ensure that subtle changes could telegraph the distinct look and feel of, say, late afternoon or early dusk. She also chose wide framing, using helicopter-style shots to establish a sense of vastness. “I’m trying to capture a certain emotion,” she says. “I want it to make me homesick, in a way.”

Though Calahan aimed for authenticity—water that looks cold, rocks that appear hard and dangerous—her goal wasn’t photo-realism. That’s where her fine-arts background came in. “I’m not painting every blade of grass or every leaf,” she says. “I’m reducing things down to their essential elements and bigger shapes.” Those pieces combine to create a stunning new world, with Calahan’s brushstrokes all over it. —LEXI PANDELL

ALPHA GEEK

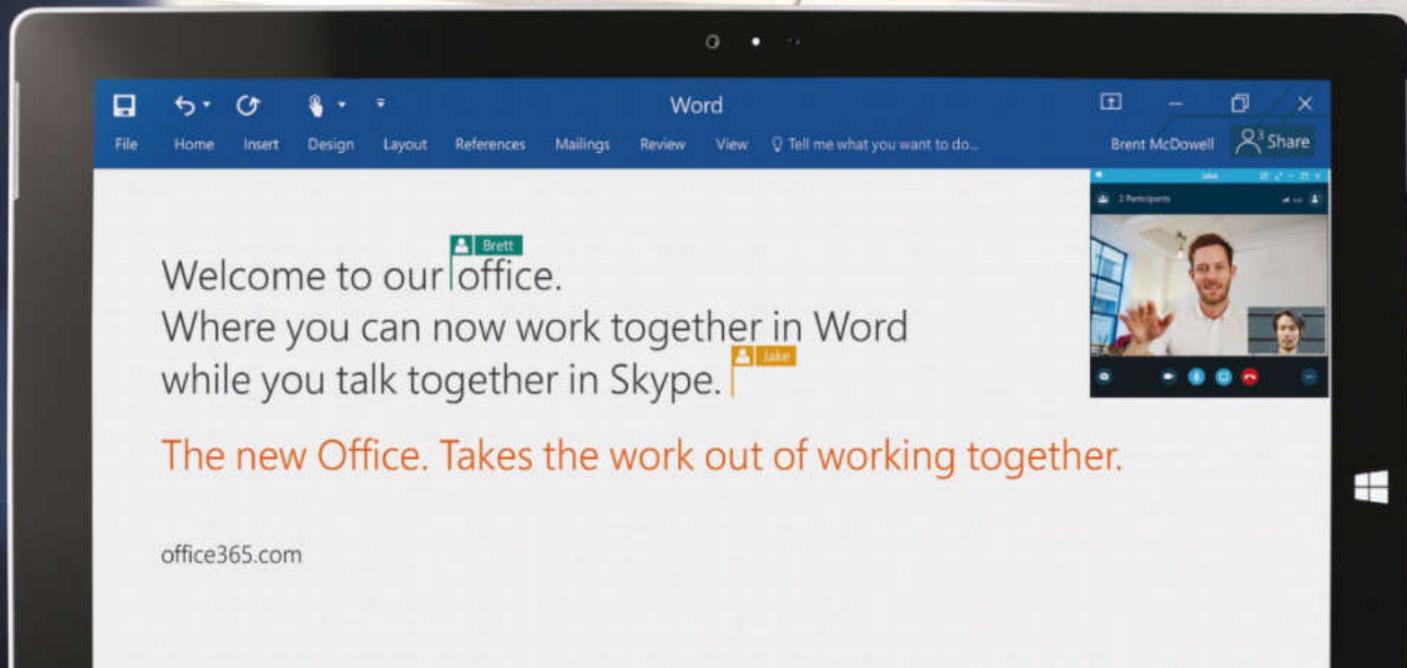
# LEADING LIGHT PIXAR'S NATURAL WONDER



## Illuminating Brushwork

Sharon Calahan, director of photography on *The Good Dinosaur*, painted concept art for characters (like main dino Arlo) and landscapes.

EMILY BERL



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# ROAD RAGE JUST PARK YOUR OWN CAR

YOUNG MEN IN BRIGHT blue blazers are taking over the streets of San Francisco. Normally I wouldn't have a problem with this, except these guys (I've never actually seen a woman) are valets. Not for the Valentino-clad patrons of a posh restaurant or hotel, mind you—these valets are rushing around on infantilizing scooters, ready and willing to serve hoodie-wearing *you* the ultimate city-dweller fantasy. ¶ They work for Luxe, the soi-disant Uber of parking. With its \$25.5 million in funding, the year-old startup has created a suave app that lets you summon a prescreened driver to your location so he can pick up your vehicle, park it in a secure lot, and retrieve it whenever you want—all for \$5 an hour or \$15 a day. Others have wised up to the trend, and now the sidewalks of downtown

flow with the rainbow blood of a real-life color war: While Luxe valets sport blue blazers, competitors at Zirx wear yellow, and Carbon's minions flaunt a loud pink. ¶ In our oversaturated world of on-demand anything, the emergence of insta-valet services is, sadly, not shocking. We want everything to be cheap and easy, and venture-backed startups are perfectly happy to help. But at what point does our obsession with convenience go from maximizing efficiency to optimizing laziness? Parking your own car is the cost of driving in a city. That's how it is. Startups may hope to make the world a better place, but Luxe—a name that says it all—is scratching an itch of the sorta-rich at the cost of our collective dignity. Parking teaches patience; Luxe rewards indolence. It's Silicon Valley-funded entitlement at its silliest. And it might not even be so viable after all. In August, Carbon said it would be "pivoting" (ugh) into some kind of delivery service. The message is clear: Delivery is the limit for serving our sloth. We can park our own damn cars. At least until our cars can do it for us. —JULIA GREENBERG

PETER OUMANSKI

NOV 2015

## JARGON WATCH

### cybertypes

n. [sī-bər-tīps]

Three-dimensional x-ray images of newly described organisms. Cybertypes supplement holotypes, the specimens required to classify species. The first cybertype—for a millipede aptly dubbed *Ommatoiulus avatar*—was recently posted online, where the bug's identifying genitals can be dissected virtually.

### kilo-author

n. [kē-lō-ō-thər]

One thousand authors—a measure of the number of contributors listed on a scientific paper. With the rise of teamwork in genetics and particle physics, kilo-authorship is increasingly common. Some papers allot more space to bylines than research findings.

—JONATHON KEATS  
jargon@WIRED.com

### narcopaloma

n. [när-kō-pä-'lō-mə]

A pigeon taught to smuggle drugs into prisons. Trained using a feeding regimen, the narco-paloma is released to fly into jails with small bundles of cocaine and marijuana strapped securely to its breast. The name—"drug dove" in Spanish—became popular after guards nabbed one west of San José, Costa Rica.





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**"The Plaza at night is an almost magical place. The profiles of all the old Spanish-decor buildings are illuminated for several blocks with Christmas lights. It's a fun place to walk."**

—Bill Zahner, architectural metal designer (New York's 9/11 Memorial, KC's Kauffman Center)

**MIDWESTERN CITIES** tend to sprawl, but in Kansas City a revitalized urban core has drawn dreamers back downtown. Supercharged by the introduction of Google's high-speed gigabit service in late 2012, this former stock-yard town in Missouri now regularly hosts startup pitch sessions, hackathons, and—inevitably—converted-warehouse parties. In fact, even the city's most celebrated tradition (not counting amazing barbecue) has received an upgrade. On Thanksgiving, revelers will turn up for the Plaza Lighting Ceremony, when 15 blocks of the historic outdoor shopping district will twinkle with tens of thousands of festive lights. You bet they're LEDs (mostly). —BEN PAYNTER



### See

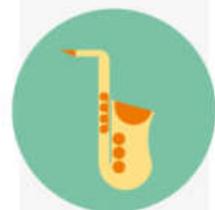
Marvel at the more than 72,000 playthings—some rendered to one-twelfth their original size—at the **National Museum of Toys and Miniatures**. Then pose beside the four 18-foot-tall shuttlecocks created by big-time artists Claes Oldenburg and

Coosje van Bruggen at the **Nelson-Atkins Museum of Art**. Later, catch a concert inside the **Kauffman Center for the Performing Arts**. The space-age and skyline-defining building has a 15,000-square-foot glass wing, anchored by 27 steel cables, that offers 180-degree city views.



### Do

Explore the **Linda Hall Library**, which contains a first edition of Darwin's *On the Origin of Species*. On the first Friday of each month, wander through the city's gallery-riddled **Crossroads Arts District**. (Start at the **Liberty Memorial**, a 217-foot spire that pushes steam past colored lights to create the visual effect of a giant torch still burning in memory of WWI veterans.) Stay up way too late at the **Mutual Musicians Foundation**, an all-night jazz club with jam sessions Friday and Saturday nights. This National Historic Landmark serves booze until dawn.



### Eat

Plow through the holy trinity of KC-style BBQ at **Arthur Bryant's**, **Gates**, and **Joe's KC**, which shares space with a gas station. Then learn what it takes to carve choice cuts with a whole-hog butchery class at the **Local Pig**. They serve plenty of **Boulevard Brewing** beer, so be careful with those knives! Or tour the brewery itself to taste **Tank 7**, a strong farmhouse ale originally made by accident in one of its brew tanks.

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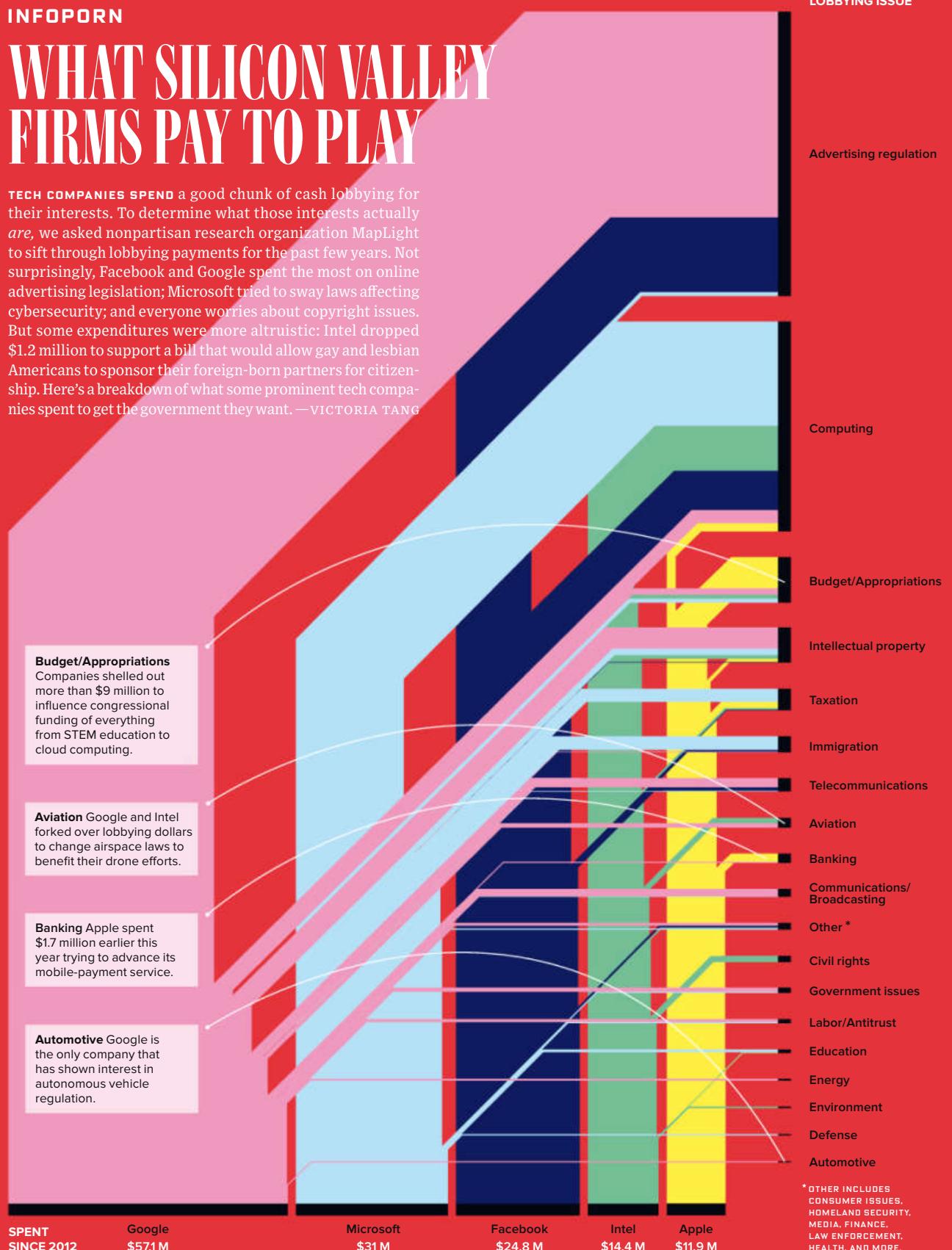


KEEP CLIMBING

 DELTA 

# WHAT SILICON VALLEY FIRMS PAY TO PLAY

**TECH COMPANIES SPEND** a good chunk of cash lobbying for their interests. To determine what those interests actually *are*, we asked nonpartisan research organization MapLight to sift through lobbying payments for the past few years. Not surprisingly, Facebook and Google spent the most on online advertising legislation; Microsoft tried to sway laws affecting cybersecurity; and everyone worries about copyright issues. But some expenditures were more altruistic: Intel dropped \$1.2 million to support a bill that would allow gay and lesbian Americans to sponsor their foreign-born partners for citizenship. Here's a breakdown of what some prominent tech companies spent to get the government they want. —VICTORIA TANG



\* OTHER INCLUDES CONSUMER ISSUES, HOMELAND SECURITY, MEDIA, FINANCE, LAW ENFORCEMENT, HEALTH, AND MORE.



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EVERYDAY LIFE RUNS ON ENERGY. BUT MUCH OF THIS ENERGY PRODUCES CO<sub>2</sub> EMISSIONS. SO, WHAT IF WE COULD HELP TO STOP CO<sub>2</sub> FROM EVER REACHING THE ATMOSPHERE? THAT'S EXACTLY WHAT SOME PROJECTS AROUND THE WORLD ARE ALREADY DOING

# THE CARBON CONUNDRUM

If you think about your everyday life – the smartphone you use, the machine that brews your coffee, and the bus, train or car that takes you to and from the office – it's all powered by energy. As the number of people on the planet increases, so will the desire for goods and services – and the need for energy. Meeting growing energy demand while limiting CO<sub>2</sub> emissions is a global challenge for both society and business.

"We have long recognized both the importance of the climate challenge and the critical role energy has in enabling a quality of life that people deserve, wherever they live," says Tim Bertels, Shell head of CCS (about which more later). "By 2050, our world could be home to nine billion people – that's almost two billion more than today. All energy sources will be needed to meet that demand while addressing environmental stresses."

So what's the answer? One option is using a technology called carbon capture and storage (CCS). This is a method of capturing CO<sub>2</sub> emissions from energy production and industrial processing sites, such as power stations, and putting it deep underground again. After all, that's where hydrocarbons – oil and natural gas – were for millions of years before they were extracted.

"The availability and reliability of hydrocarbons are important factors to help ensure that everyone has access to energy, and they can be used to complement the increasing proportion

of renewables in the mix. To address the challenge of increasing energy supply – but reducing CO<sub>2</sub> emissions – it is essential to make hydrocarbons cleaner. CCS helps achieve this," says Bertels.

Several respected international bodies agree that CCS is a highly desirable development in energy production. The International Panel on Climate Change estimates that without CCS the cost of limiting the global temperature rise to 2°C would be around 138 per cent higher. The International Energy Agency (IEA; an autonomous intergovernmental organisation founded in 1974) estimates that CCS could deliver about a fifth of necessary worldwide reductions in greenhouse gases by 2050 and a half by 2100.

Bertels sees the environmental and financial savings: "The scale of potential future deployment of CCS is enormous, spanning manufacturing, power-generation capture, transport and storage developments worldwide." The IEA estimates the costs of achieving global climate objectives without CCS to be over 40 per cent higher. The Energy Technologies Institute found that



without CCS the additional costs needed just to run a decarbonized UK economy in 2050 would be £32 billion per annum.

CCS is already in action at the Shell Quest CCS project, at the Scotford Upgrader northeast of Edmonton, Alberta. The Scotford Upgrader processes bitumen produced from the oil sands in northern Alberta. With Quest, CO<sub>2</sub> is captured from the upgrading process and stored underground more than 1.2 miles below the Earth's surface. Shell is on a quest to capture and store about a million tons of CO<sub>2</sub> each year, equivalent to taking approximately 175,000 cars off the road. The Quest project has benefited from CAN \$865 million of investment from the Canadian and Alberta governments.

Similarly, the proposed Shell and SSE CCS project at Peterhead Power Station, near Aberdeen in Scotland, could result in the capture of up to 10 million tons of carbon dioxide emissions over the project's lifetime. The emissions would be transported by

**QUEST WILL CAPTURE ABOUT A MILLION TONNES OF CO<sub>2</sub> PER YEAR, EQUIVALENT TO TAKING 175,000 CARS OFF THE ROAD**



Banff National Park in the Canadian Rockies, Alberta

pipeline offshore for long-term storage deep under the North Sea.

Shell will share the learnings from its CCS projects to help enable more CCS projects to be developed. So how does carbon capture and storage work?

There are three types of carbon-capture techniques in operation around the world. These include pre-combustion, post-combustion and oxyfuel combustion (see right). Once captured, the CO<sub>2</sub> is condensed into a liquid and transported via pipeline or

truck to the chosen storage site.

When stored in a reservoir after being captured from an industrial plant, CO<sub>2</sub> would be held in place by an impermeable cap rock. This type of rock held the natural gas securely in the reservoir for millions of years. The pressure is kept within safe limits so that the reservoir and its cap are not damaged.

Shell will play its role in providing those solutions to bring more energy and less CO<sub>2</sub>, especially in areas where we have, and can develop, skills such as natural-gas production, future fuels, such as biofuels and hydrogen, and CCS. Shell will do it because it knows that its long-term viability as a company depends on its ability to anticipate the types of energy that people will need in the future, in a way that is both commercially competitive and environmentally relevant.

CCS is projected to be a critical tool in the quest to power the planet and enable human progress. It gives us the best of both worlds, which is important because we are not lucky enough to have two worlds.



The Quest Carbon Capture and Storage project in Alberta, Canada

## HOW CCS WORKS

There are three opportunities to capture carbon-dioxide emissions before they can reach the atmosphere



### Pre-Combustion

Upgrading a barrel of crude oil includes adding hydrogen. Making that hydrogen is one of the primary causes of high CO<sub>2</sub> emissions in the oil upgrading process. This is the first opportunity that CCS presents:

involves burning the oil and releasing CO<sub>2</sub> emissions. This is the second opportunity to use CCS-post-combustion. Here it is captured after the combustion of the fuel, but before emission.

### Oxyfuel combustion

In the case of oxyfuel combustion, pure oxygen [O<sub>2</sub>] is used rather than air when the fuel is combusted. This produces

### Post-combustion

After the oil is upgraded it is transported and used for a range of different products and applications. One of these is generating electricity, which

1. "Oblivion," from *Visions*
2. "Go," with Blood Diamonds
3. "SCREAM," from *Art Angels*



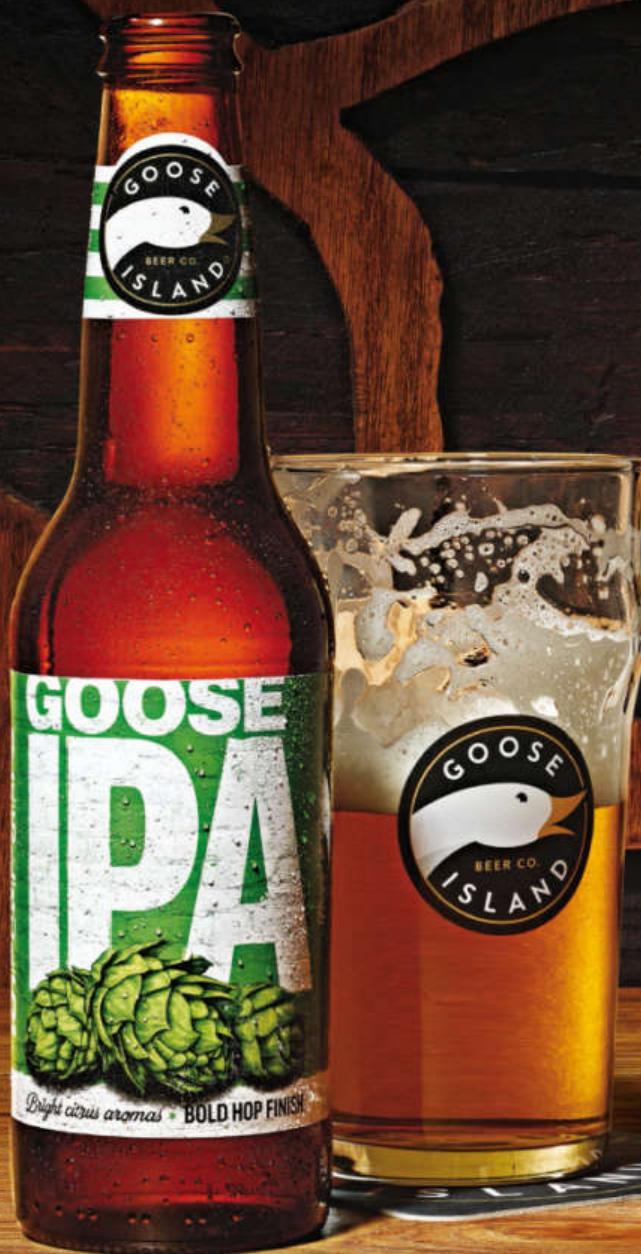
# RECORD-IT-YOURSELF GRIMES KEEPS GOING HER OWN WAY

**ELECTRO-POP MUSICIAN** Grimes (aka Claire Boucher) admits she didn't really know what she was doing when she made her last album, 2012's gauzy *Visions*. Still, that release—self-produced in GarageBand over about two weeks—was an out-of-the-ether success, setting Boucher on a path to stardom: She signed with Jay Z's Roc Nation management company, toured with Lana Del Rey, and recorded a track with Bleachers for an episode of *Girls*. Despite this elevated profile, the 27-year-old remains fiercely DIY, honing her studio skills and dismissing suggestions that she work with outside producers. Her latest release, *Art Angels*, is bolder, noisier, and more out there than *Visions*. Take "SCREAM," which features obscure Taipei rapper Aristophanes spitting Mandarin over digitally processed screams. Or consider that Boucher wrote some songs from the POVs of a "Suicide Squad-y" crew of alter egos with names like Screechy Bat and Pixel Dust. Or, actually, don't. "They're part of a mythology that exists in my head," she says. "I don't want to turn them into action figures." Boucher will allow that she identifies with the villains she's dreamed up: "Everyone's so goody-two-shoes—they want everything so clean and professional. Fuck that." Perhaps grime does pay. —MARK YARM

Grimes might have a cast of characters in her head, but she doesn't want you to know much about them. "I may regret revealing any of their names," she says.

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TO WHAT'S NEXT. [GOOSEISLAND.COM](http://GOOSEISLAND.COM)





# MIND THE GAP A BRIDGE FOR DISASTERS

## Watch It Grow

Traditional temporary bridges take several days to assemble. The Mobilebridge can be installed in an hour—and expands in just five minutes.

12

WEIGHT OF THE  
MOBILEBRIDGE IN TONS  
(IT CAN SUPPORT  
A 5-TON VEHICLE)

When a major flood or earthquake strikes, people need help—quickly. One challenge is getting to them. Roads can crack open; fields can wash away; bridges can collapse. Temporary structures haven't always proved practical—

they're too flimsy or take days to set up. But Ichiro Ario and his team at Hiroshima University hope to fill that void with the Mobilebridge, a collapsible overpass that can rapidly span gaps and support cars carrying emergency supplies. Though Ario's studies in materials science and origami informed the design, the real inspiration for

the accordion-like mechanism came from watching his son play with a toy pistol: Whenever he pulled the trigger, a section of the barrel would scissor out. The Mobilebridge is just 10 feet thick all folded up, but flip a switch and the steel and aluminum structure flattens out in spectacular fashion to nearly 70 feet long. "It's like a robot bridge or a bridge machine," Ario says. For a test

earlier this year, workers towed the Mobilebridge by trailer to Japan's Hongo River, where installation took about an hour. That's fast—and in a real emergency, speed makes all the difference.

—LYDIA BELANGER



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ALPHA

BOOKS

# HOW STUFF WORKS

## RANDALL MUNROE EXPLAINS IT ALL

### Writing Stick

**The Wood Kind**  
(makes lines you can change)

#### Points

This kind of writing stick gets less pointy as you use it, so you have to keep cutting it to make a new point.



Sometimes you get a nice sharp point, but sometimes it's hard to get right.



When this happens, it can make you decide the thing you were writing wasn't very important after all.



**TO DESCRIBE COMPLEX THINGS** like rockets and trees, it helps to use simple words. *Really* simple words. That's what Randall Munroe did for his upcoming book *Thing Explainer*. Munroe, creator of the webcomic *xkcd* and author of the 2014 best seller *What If?*, drafted blueprints for various devices and systems—using only 1,000 common words to describe them—from washing machines (sorry, *boxes that make clothes smell better*) to nuclear bombs (*machines for burning cities*). “It forced me to learn more about the stuff I was describing,” Munroe says, “since I couldn’t just say the name of the thing.” Test your nerd cred: Flip to his periodic table (gah, *the pieces everything is made of*) and quiz yourself. Quick, what’s a *rock that makes glass blue?* —SARAH FALLON

ANGRY NERD

### LET THE MONSTER DIE!

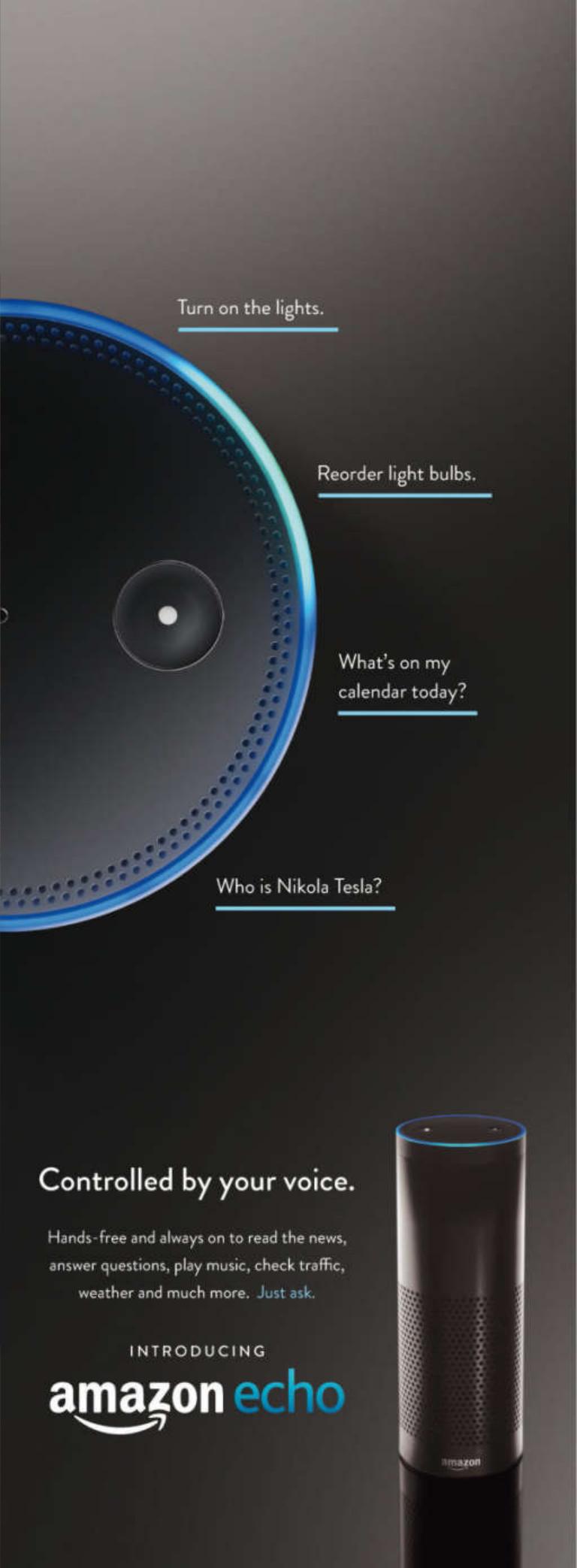
IT'S ALIIIIIIIVE! The new movie *Victor Frankenstein* brings the mad doctor's story shambling into theaters all over again—this time from the point of view of sidekick Igor. What a fantastic...-ally boring, warmed-over technique! I love Mary Shelley's masterpiece as much as anyone, but we've had at least a dozen film adaptations of her story in just the past three decades. (And I'm not counting *Monster Squad* or *Frankenhooker*.) Even the idea of giving it the alternate-POV treatment isn't original—the animated feature *Igor* did that seven years ago. In fact, we've already had a vampire movie from Van Helsing's perspective, a Sleeping Beauty movie from Maleficent's perspective, and an Oz movie from the Wizard's perspective! What's next, the waiter's version of *My Dinner With Andre*? Sloth's telling of *The Goonies*? A *Karate Kid* remake from Johnny's POV? (Actually, that last one sounds promising ...) Studios are expending all their energy trying to find a new facet on a familiar tale because they don't believe they can still sell an audience on something new. So I give up: Rather than fight the trend, I've agreed to star in yet another Frankenstein movie, but this one will be from the point of view of the pitchfork-wielding mob. It'll be a documentary, and the target of our fury will be the repulsive reanimators of Tinseltown. Meet us on the corner of Hollywood and La Brea if you'd like to skewer some “creatives”!

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What's on my calendar today?

Who is Nikola Tesla?



ALPHA

MR. KNOW-IT-ALL

Q:

# I TAKE PHOTOS OF MY FOOD IN RESTAURANTS ALL THE TIME. IS IT OK TO DO THAT AT THE FAMILY THANKSGIVING DINNER TABLE?

BY JON MOOALLEM

**A:** “Photographs are a way of imprisoning reality.” That’s an oft-quoted bit from *On Photography*, the influential 1977 essay collection by Susan Sontag. She argued that photography is a way of “refusing” to absorb new environments and experiences “by limiting experience to a search for the photogenic, by converting experience into an image, a souvenir.” Also: “Essentially, the camera makes everyone a tourist in other people’s reality, and eventually in one’s own.” ¶ On and on Sontag went, describing how the innocent-seeming act of snapping pictures

degrades what’s photographed and detaches us from the world. And this was three decades before phonecams transformed photography from “widely practiced amusement,” as Sontag put it, to omnipresent, mindless tic.

Now here you are, on the cusp of carrying that intrusive, modern habit into maybe the last bastion of unabashed, no-tech conservatism in American life, the one day when everyone agrees that even the tiniest traditions—whether the stuffing should go inside the bird, who sits at which table—matter intensely and must remain inviolate and be suffered through together; when people will even graciously take a spoonful or two of that weird yam thing that Great-Aunt Katie makes, just because she’s made it every year for as long as everyone can remember and it wouldn’t be Thanksgiving without it.

We’ve all seen how taking pictures in situations like these can feel obnoxious and petty and solipsistic, in exactly that Sontagian way. Then again, can’t taking pictures also feel appreciative and convivial and celebratory? And can’t *sharing* pictures increase a feeling of connectedness? And aren’t these exactly the kinds of feelings that fuel Thanksgiving, that give it its glow?

Gah! It just doesn’t add up.

Fortunately, Sontag also knew quite a lot about the spirit of Thanksgiving. Poet and literary critic James Fenton described sharing the holiday with her once in the 1990s, arriving with a large flower arrangement and placing it on the table. “Outrage spread over her,” Fenton wrote of Sontag. “I could see her thinking: Who on earth could have been so gross or so dumb as to put those flowers in my line of vision? We’re here for conversation, for heaven’s sake, not to look at some bunch of flowers. And then, before I could remedy the mistake, she swept the flowers away with a look and a gesture not far from fury.”

Here’s the deal. In principle, I see nothing wrong with photographing your Thanksgiving dinner. But do it in a Thanksgivingish way: Take some pics of your family too; compliment the chefs as you shoot their food; make it playful and inclusive somehow. In short, make sure you and your shutterbuggery add to the beauty of the meal, instead of being like those flowers—something beautifully intentioned but recklessly in the way. ¶



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ALPHA

WRONG THEORY

# SOME ASSEMBLY REQUIRED

## HIGH STYLE, PACKED FLAT



### Out of the Box

1. A Campaign chair (\$495) fits inside two standard boxes.
2. There are 13 individual pieces.
3. It assembles in less than four minutes.

Ikea, that daunting sprawl of neutral pieces at DIY prices, doesn't exactly appeal to the well-heeled shopper hunting for, say, a stylish new armchair. That's why the West Elms and Crate & Barrels of the world exist:

They design furniture with aesthetics and durability in mind. But have fun hauling that stuff home—a truck and a hefty fee are usually required.

Now, a company called Campaign is making high-quality furniture that travels Ikea-style. "We're designing around the logistics and the delivery

instead of thinking about it after the fact," founder Brad Sewell says. Campaign's couches and chairs pack flat, and they're engineered to fit within UPS and FedEx size requirements.

A former member of the manufacturing design teams at Apple and Honda, Sewell spent months fine-

tuning a new kind of steel frame, whittling down weight while maintaining strength. "We're leveraging CNC cutting machines generally reserved for the automotive industry," he says. Foam cushions swaddled in natural-fiber upholstery turn the metal skeletons into midcentury modern perches.

Campaign, which starts shipping in November, exists only online. But if asking decorators to buy something sight unseen sounds like design suicide, consider this: Campaign furniture is delivered right to your door and can be assembled in minutes. No tiny tools, no inscrutable instruction manuals—just more time to relax.

—MARGARET RHODES

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IS 300 AWD F SPORT

IS 200t F SPORT

1. Claim based on average horsepower from Lexus IS line year over year vs. 2016 Lexus IS line. 2. Ratings achieved using the required premium unleaded gasoline with an octane rating of 91 or higher. If premium fuel is not used, performance will decrease. 3. Performance figures are for comparison only and were obtained with prototype vehicles by professional drivers using special safety equipment and procedures. Do not attempt. 4. Claim based on 6.6-second 0-to-60 time of the 2016 Lexus IS 200t vs. 7.7-second 0-to-60 time of the 2015 Lexus IS 250. 5. Base model comparison of 255 horsepower for the 2016 Lexus IS 300 AWD vs. 204 horsepower for the 2015 Lexus IS 250 AWD. ©2015 Lexus.



ALPHA

## WHAT'S INSIDE

# INSTANT MASHED POTATOES\* FAUX BACON, REAL STARCH



THE VOORHES

**Idaho Potatoes**

Extracting water lets the starchy tubers sit on the shelf for years without spoiling. Back in the 1950s, food scientists discovered that the best way to desiccate spuds is the "Philadelphia cook," in which taters are partially cooked, cooled, steamed, and then dehydrated in a single-drum dryer to 6 percent moisture.

**Calcium Stearoyl Lactylate**

This molecule boosts overall stability, keeping rehydrated potatoes from turning into a lumpy glue. It includes stearic acid, an 18-carbon fatty acid chain, which also helps keep the mix from separating into its oily and watery components.

**Maltodextrin**

A nonsweet sugar that's almost tasteless but helps to absorb the water you add to dehydrated potatoes, so they firm up instantly. This polysaccharide comes in a variety of chain lengths, from three to 19 glucose units long. The -OH groups in these polar sugar molecules bond with H<sub>2</sub>O to ensure that no liquid escapes.

**Autolyzed Yeast Extract**

Cannibalized microbes give instant mashed potatoes a delicious savory tang. The umami taste comes from yeast that autolyzes, or self-digests, by releasing native enzymes that grind up its insides—proteins, carbs, nucleic acids. It all goes into the extract, but much of the flavor comes from glutamic acid in proteins (think MSG), which binds with taste receptors on the tongue.

**Bacon-Flavored Crumbles**

Vegetarians—rejoice! There's nothing even close to pork in here: soy flour, dextrose, caramel color, red #3... the list goes on. The soy flour is compressed and heated, causing the proteins to unspool, before being extruded as chunks of "textured vegetable protein." Result: crumbles with a flavor and chewy consistency that could be described as "baconesque."

**Disodium Inosinate, Disodium Guanylate**

Flavor enhancers that can be derived from nucleic acids in dried meats. (Strict vegetarians beware!) Food scientists often mix disodium inosinate and disodium guanylate in equal parts, because they have a weird synergistic effect with glutamate—they boost flavors more effectively together than when used alone.

—ANNIE SNEED



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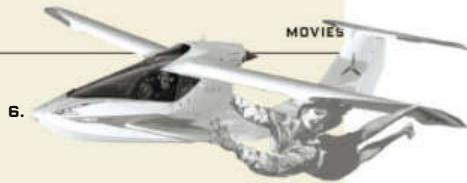
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ALPHA



GERMS



## BOND, REAL BOND ACTUAL GADGETS FOR 007

James Bond has had some badass tech over the years—wristwatch lasers, ejector seats. And now (at last!) real life has caught up. For the new film *Spectre*, Q should have just bought this stuff from eBay and knocked off early. —CHARLEY LOCKE

1.

**Bond version:** Virtual reality glasses (*Die Another Day*)

**Real version:** Mini Augmented Vision glasses  
Mini's goggles are equipped with Wi-Fi and GPS, and they project a 3-D HUD. An external camera array allows you to "see through" the opaque portions of your car.

2.

**Bond:** Face recognition database (*Quantum of Solace*)

**Real:** larpa's Janus program  
The Intelligence Advanced Research Projects Activity's creation recognizes people in photos even if their faces are in profile, out of focus, or poorly illuminated.

3.

**Bond:** Aston Martin DB10 (*Spectre*)

**Real:** Aston Martin Vulcan  
Aston Martin specially designed the DB10 for *Spectre*, but its Vulcan supercar is cooler. It has a carbon monocoque, magnesium torque tube, carbon driveshaft, and Brembo brake calipers.

4.

**Bond:** Bell rocket belt (*Thunderball*)

**Real:** Martin Jetpack  
The Bell belt was real and could actually keep a person airborne for 20 seconds. But with 30 minutes of flight time at up to 46 mph, the newer Martin Jetpack could actually be 007's costar, not just a bit player.

5.

**Bond:** Lotus Esprit (*The Spy Who Loved Me*)

**Real:** KTM 300 SX surfing motorcycle  
OK, a sports car that turns into a submarine with the press of a button is pure movie magic. But give props to stunt rider Robbie Maddison, who actually outfitted his chopper with a giant water ski.

6.

**Bond:** Acrostar mini jet (*Octopussy*)

**Real:** Icon A5 Light Sport Aircraft  
Bond's folding jet was real and could fit in a truck trailer, but it couldn't land on water. For amphibious flying needs, look at Icon's compact plane, which can fold up for easy storage in Q's garage.

## THE SLOBBER CURE

Jazzie spent the summer in foster care, balancing naps on the porch with more demanding tasks like digging holes. The 5-year-old Lab mix had moved in with Richard Kay, a 62-year-old who'd been living alone on the outskirts of Tucson. The two were paired up as part of a clinical trial to see if dogs could do double duty as companions and probiotics-delivery devices—or as Chuck Raison, the lead investigator, puts it, "pioneers of microbial goodness." Raison, a professor of human ecology and psychiatry at the University of Wisconsin, knew that adults living under the same roof share about as much of the same bacteria with their canine pals as they do with each other, and that children who live with dogs tend to have lower rates of asthma. Raison hopes to show that dogs can introduce microbes that dampen inflammation, which causes myriad problems for seniors. The bacteria might also help intestinal microbe populations—in the elderly, a compromised microbiome can indicate frailty. There could be an emotional health benefit too. Raison had volunteers swab saliva, skin, and feces—off themselves and the dogs. (The humans also took psychological tests.) The results aren't in yet, but Raison says the study has been unprecedented: "We've had these emails, 'You changed my life. This dog saved me from deathbed depression.' There's not an antidepressant I've seen that has anywhere near the impact on emotional well-being." So far, it seems like Raison is barking up the right tree.

—PETER ANDREY SMITH

ILLUSTRATION BY MICHAEL MARSICANO





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ALPHA

3-D MODELING

# ATTACK OF THE CLONES STAR WARS PROPS INVADE A VIDEOGAME



NOW THAT J.J. ABRAMS' *Star Wars: The Force Awakens* is just weeks away, the wait is more agonizing than ever. Sure, Disney has been shipping tie-in merchandise for months, but no mere toy will rescue us from the tedium. Unless that toy happens to be, say, a digital replication of an original prop, so realistic it's like you're wielding the real thing. And that's exactly what's coming with *Star Wars Battlefront*, a reboot of the classic videogame series. Using a combination of scanning tech and reference shots, developers at the Stockholm-based studio DICE modeled in-game weapons and set pieces after originals from the movies—and "brought them back to their original glory," says Sigurlína Ingvarsdóttir, *Battlefront's* senior producer. Suddenly, a little more waiting doesn't sound so bad. —EWEN HOSIE



## Vader's helmet

The team at DICE relied on a process called photogrammetry: shooting props from multiple angles in order to construct perfect 3-D replicas. But when they got their hands on the most evil breathing apparatus in the universe, the helmet turned out to photograph quite poorly—it was too hard and shiny. Lucasfilm wouldn't let them dull the surface with matte paint (obviously), so DICE touched it up in post.



## Spaceships (X-wings, TIE fighters, Millennium Falcon)

Some X-wing and TIE fighter models were so old—going on 40 years now—that their plastic had turned yellow, so *Battlefront's* artists had to give the ships a digital respray of paint. In the game, they look nice and polished—until you blow one out of the sky.

## Boba Fett's Mandalorian armor

Because the scanning process requires absolute stillness, designers hung the bounty hunter's distinctive uniform on a mannequin. Costumes proved among the easiest objects to capture: Their soft, textured surfaces were better suited to photogrammetry than reflective helmets or spaceships.

## AT-ST walkers

Sometimes, photogrammetry didn't work at all. AT-STs, for example, "have a very particular way of moving and turning that makes them menacing," Ingvarsdóttir says. To reproduce their chicken-like strut, the team used footage from the movies as a reference.



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## WATCH WHAT YOU SAY THE CLOUD MIGHT BE LISTENING

LET'S SAY YOU'RE TALKING to your brand-new Apple TV. You click the remote and rainbow-colored sine waves on your flatscreen indicate Siri is listening. It's slick: You ask for a channel or to replay a scene and it responds smoothly. But then you say, "Show me some new comedies," and maybe it suggests ... *Pixels*. Of course, *Pixels* is a *wretched* movie, so you look at the next suggestion, and oh, man: *Hot Tub Time Machine 2*. Now you're cursing into the remote, just to see what happens. ¶ The thing is, Apple TV doesn't keep your foul language to itself. To understand your speech, it sends the audio to Siri's cloud servers, where it's processed—and archived, for up to two years. ¶ Welcome to the latest, weirdest phase of our relationship with technology: machines that eavesdrop on us. It's a side effect of the Internet of Things. As processors shrink, inventors have been stuffing digital smarts into everyday appliances. But since you can't easily put a keyboard on a coffeepot, the easiest input method is voice. This has sparked an explosion of tools with ears: There's the Nest webcam (which perks up when it detects activity in your house), Amazon's cylinder-shaped Echo personal assistant, and the Hello Barbie doll—which, when

your child pushes a button and talks to it, sends whatever they say into the ether.

It's a now-classic example of a privacy trade-off. Ergonomically, voice control rocks. I use it all day long on my phone and would happily use it to control my house, car, and radio. But voice has unusual emotional freight. You wouldn't like racy texts to your partner or angry emails to a business colleague leaked in a hack, would you? Now imagine the same stuff leaked, except it's the audio of your voice speaking them aloud.

Marc Rotenberg, head of the Electronic Privacy Information Center, suspects most people don't realize their audio goes online for processing. They think the device just "understands" their voice on its own. "I see a serious disconnect between how most consumers believe these devices operate and how they operate in fact," he says. He's likely right. Who expects a toaster to be tattling to Google?

To be fair, most of these devices record your voice only after you invoke their genie-like wake-up phrase, as when you shout "Alexa" at Amazon's Echo—a technique called "phrase spotting." These gadgets are not, the companies say, streaming your voice all day long. But it'd be good for the devices to provide very strong cues about when they are and aren't recording. The voice-controlled robot Jibo, for example, has been designed to signal when it is actively listening: It slumps over when dormant and swivels its head when it's alert. "We take these issues seriously," Jibo CEO Steve Chambers says.

Will we just acclimatize to being overheard all day long? Chambers thinks so. The next generation has grown up trading information for convenience, he says. "I'm not sure younger people will have quite the issue I might." He's right, though as with our other shoulder-shrugging privacy accommodations—persistent GPS tracking, for example—I'm not sure that's a good thing.

I'm hoping for a technological solution. Audio processing is getting cheaper and faster all the time. Our listening tools could soon be able to process speech right in our houses and pockets, without needing to squirt it across the country to a server. Having machines that hear what we say will be enormously useful. But it'd be nice if they kept our secrets too. ■

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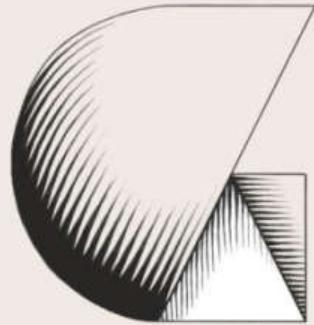
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COOK: DANSK KOBENSTYLE CASSEROLE

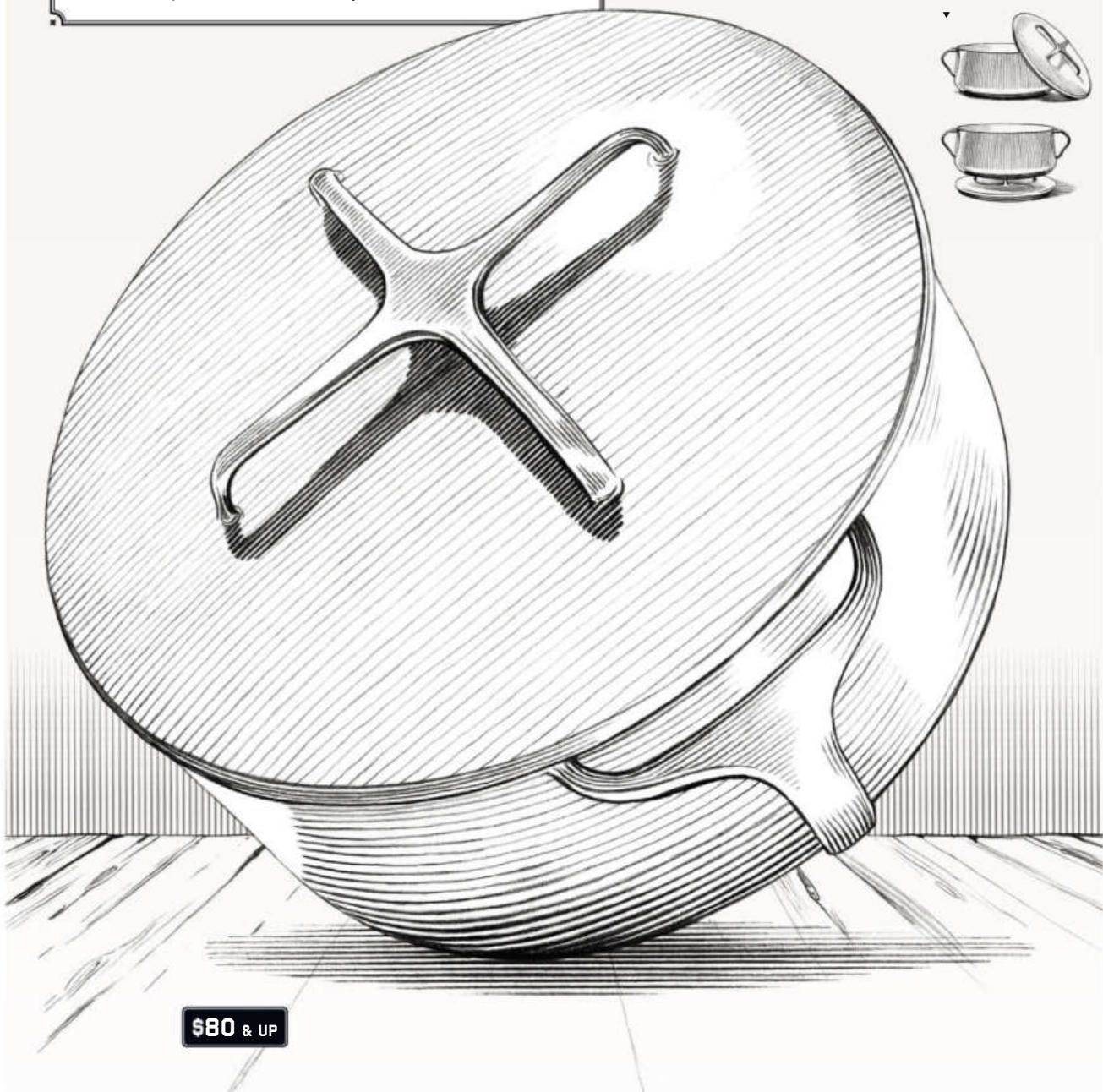
## FETISH LET'S DANSK

**THE DEFAULT DUTCH OVEN** for most cooks is Le Creuset. It's been that way since the brand showed up in the hands of Julia Child on PBS in the 1970s. But that doesn't mean you should buy one. That French pot may be great for simmering cassoulet, but it's never been displayed at the Louvre or MoMA. It hasn't won four international design awards either. Those tributes belong to this Technicolor gem: Dansk's Kobenstyle. The elegant enameled pot, the brainchild of Danish designer Jens Quistgaard, was released in 1956 and became a big hit with the mid-mod crowd. Integral to its design is a bit of dinner theater—remove the lid with a flourish and place it on the table, where it instantly converts into a trivet. Order a modern-day recasting of the Kobenstyle in 2-, 4-, and 6-quart sizes and in an array of colors. —RENE CHUN



### GADGET LAB

It's simple—the lid lifts off and you place the pot directly on top of it.



\$80 & UP

1

### KitchenAid Pro Line Series 7-Qt. Bowl Lift Stand Mixer

The Pro Line Series is the beefier big brother to your mom's classic mixer, with a 7-quart bowl and the all-important dough hook. A monster 1.3-horsepower motor means you'll never knead more power.

\$700

2

### Baking Steel Griddle

The heat-transfer abilities of steel (better than stone) translate into a beautiful, airy pizza crust. In the morning, move it to the stove top and flip it to treat sleepover guests to bacon and pancakes hot off the griddle.

\$249

3

### Tovolo 2-in-1 Pizza Wheel

There are plenty of nontraditional options in the pizza-cutter market, but none work as well as a classic wheel. This roller has interchangeable blades: polycarbonate for nonstick surfaces and metal for everything else. Plus, it's dishwasher-safe.

\$16

3

4

### Primal Kitchen Walnut Pizza Peel

A peel is an essential tool that delivers your pie to and extracts it from the oven. This one, made in the US out of black walnut, is worth the dough based on looks alone.

\$89

5

### Birdkage Waxed Classic Bib Apron

Get a bit of sauce on you? If you're wearing this good-looking apron with deep front pockets and generous ties, you're in luck. It's made with waxed cotton like a Barbour coat; just sponge off the slop and keep slinging pie.

\$144

COOK

PIZZA NIGHT

GEARHEAD

# POWER OF PIE

Making pizza at home should be an event. From hot steel to a sharp wheel, these tools make it happen. —JOE RAY

### Upper Crust

Best pizza dough recipe? Mark Bittman's, from *How to Cook Everything: The Basics*.



1

4

4

2

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NOV 2015



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1

Grind 10 ounces  
of beans  
very coarsely.

Baratza  
Encore Grinder  
\$129



3

Wait 12 to 16  
hours, then drain  
through a filter.

Oxo Cold Brew  
Coffee Maker  
\$50

2

Slowly add  
40 ounces  
of cold filtered  
water, then stir.

Soma Pitcher  
\$39



2

Slowly add  
40 ounces  
of cold filtered  
water, then stir.

## HOW TO SLOW BUZZ

It's easy to make supersmooth cold-brewed java at home. You just need a few key pieces of gear and a lot of patience. —ERIN BIBA

**WE REGRET TO** inform you that you are abusing your coffee. If you brew it hot—and we know you do—many of the lovely flavors in the beans get stripped out by the heat. But when you cold-brew your java, steeping the beans in cold water for 12 to 16 hours, the process extracts all the best flavors and leaves the harsh, bitter notes behind. “When you filter the next day, you’re getting a smooth, low-acid brew that tends to be more naturally sweet,” says Diane Aylsworth, director of cold brew for Stumptown Coffee in Portland, Oregon (of course). For making it at home, she recommends coarsely grinding a Latin American

coffee bean—either Costa Rican or Guatemalan because of their richer flavors. Let it steep in cold water at least half a day, then filter it really, really well. And don’t forget: Your final product will be a concentrate, so you’ll need to dilute it with water and ice. Want hot coffee? Mix in boiling water instead.

4

Dilute with  
two parts water  
to one part  
concentrate—it’s  
very strong!



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## HEAD-TO-HEAD

## COUNTER KINGS

For quick tasks—warming leftovers or broiling a steak—these machines bring the heat faster than your full-size oven. —RENE CHUN


**Breville Smart  
Oven Pro**

**BEST FOR:** Genuine gourmands stuck in urban microkitchens

This culinary marvel is small in stature, but it's roomy enough to cook a 5-pound bird. It also has a 10-hour slow-cook function, an ingenious defrost-then-cook function, and an interior light. Ten presets make quick work of everything from toast to roast. Best feature: Open the door and magnets pull the rack out for easy access to your squash frittata.

**\$270**

**KitchenAid  
Convection Digital  
Countertop Oven**

**BEST FOR:** Microwave cooks who dream of being Iron Chefs

All the needs of a budding chef de cuisine crashing in mom and dad's basement are here: three rack levels, big-boy heat, a convection fan, and nine presets. The closer is the Asado Roast function: Five heat elements kick in at different times during the cook cycle to crisp, brown, and sear. Even humble mac 'n' cheese gets a gourmet spin.

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## FETISH

## WEIGH AHEAD

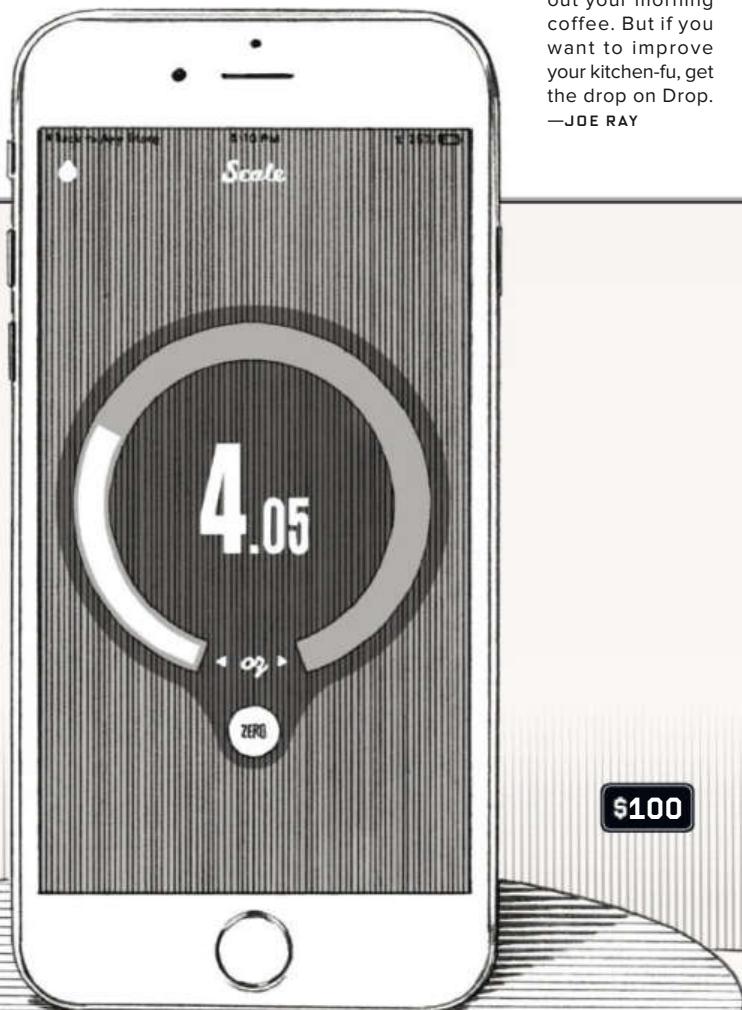
ONE OF THE BEST restaurant tools has been slow to catch on in home kitchens: the humble scale. Americans' reluctance to use weight to measure ingredients has a lot to do with our recipes being written in a volume-centric style. Weight measure is more accurate—dry ingredients can compress when you scoop them, introducing variations in volume—but we still stick with our cups. The Drop scale and its attendant app could get you to change your ways. It connects to

an iPhone or iPad via Bluetooth LE. The iPad app offers nearly 300 recipes. It weighs each ingredient onscreen as you add it and gives step-by-step recipe guidance—from flour in a bowl to cookies in the oven. (The iPhone app will be updated soon to include recipes.) It's not perfect; the scale itself lacks a display, so you need your phone or iPad to weigh out your morning coffee. But if you want to improve your kitchen-fu, get the drop on Drop.

—JOE RAY

**Must-Weigh  
Recipes in the  
iPad App**

Anzac Biscuits  
Granola  
Oatmeal Cookies  
The Best Burger



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We create chemistry

## GEARHEAD

## POUR JUDGE

There's no wrong way to enjoy a glass of vino, but there is a **better** way. Here's the gear that will help you do it. —LIZ STINSON

**Best Serving Temps**

INTENSE REDS: 65° F  
FRUITER REDS: 50–55° F  
WHITES: 45–50° F  
BUBBLY: 47–50° F

**Zalto Bordeaux Glass**

The design of a wine glass is about more than just style, it's about providing the right venue for the flavors. Each of these vessels is mouth-blown from a single piece of glass, giving you a seamless vehicle for bringing your most powerful reds to life. Plus, the mouth is big enough to cram your whole nose in.

**Cliff Spencer Rift Cut White Oak Ice Bucket**

That cheap hotel room pail has given the ice bucket a bad name. This geometric update hides its stainless steel lining behind a handsome octagonal white oak exterior. A cooling bottle of rosé has never looked better.

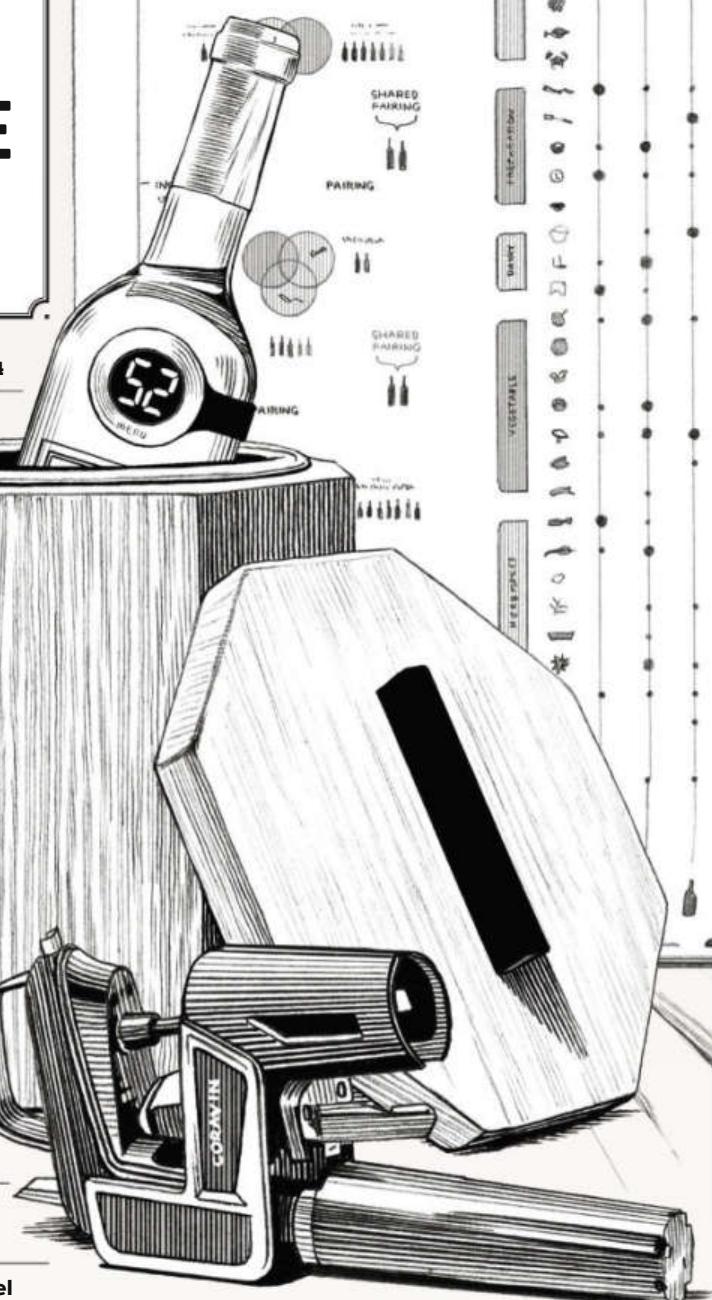
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\$366 FOR 6

**Coravin Model Two**

Open a bottle of wine without actually opening it. Coravin's newly redesigned system uses a hollow needle that pokes through the cork; wine pours through the needle, and air in the bottle is replaced with inert argon gas, so your leftover wine doesn't spoil. Just like magic! (Only it's science.)

\$330

**Menu Wine Thermometer**

Your juice tastes best when it's served at the proper temperature, but sometimes it's hard to know exactly what numbers you're working with. Strap this around the body of your bottle like a belt and get a precise reading.

\$30

**Winefolly Advanced Food & Wine Pairing Poster**

Can't remember what goes best with Brie? This poster, designed by three sommeliers and a chef, turns more than 300 pairings into a vibrant chart that walks you through every gustatory challenge.

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## BENCHMARK

## LEADING EDGE

Whether slicing shallots or  
frenching a rack of lamb, most cooks rely on  
just one blade. —JONATHON KEATS

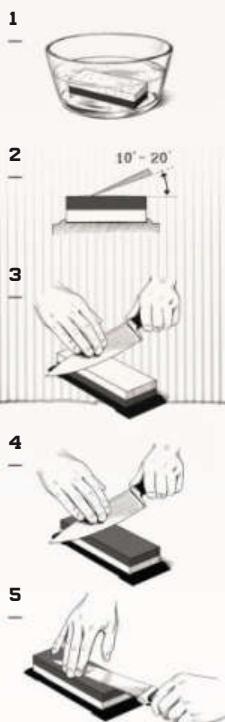
**MINCE, JULIENNE, CHIFFONADE.** The essence of French gastronomy is cutting, and from fillet knives for cleaning fish to *tourné* knives for carving spuds, cutlers in the town of Thiers have been making specialized knives for every sliver and slice of haute cuisine since the rise of the multicourse meal in the 1800s. Yet there was one knife that could do it all. With its straight triangular blade, the French chef's knife is the culinary equivalent of the smartphone. The tip can be used for peeling and trimming. The cutting edge is honed for precision slicing. The heel has a wedge shape suited to butchering meat. When garlic needs to be crushed, just press the flat side into service.

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Chef's Knife  
**\$149**

#### How to Sharpen With a Whetstone

11 Soak the stone in hot water. 12 Hold the knife at a consistent angle throughout. 13 Draw the blade back and forth across the stone, applying pressure. 14 Flip the stone, moving from coarse to fine grit. 15 Turn lengthwise to finish.



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IMAGINE LESS | DO WHAT'S BEEN DONE

INSPIRE NO ONE | GIVE UP | HOLD BACK

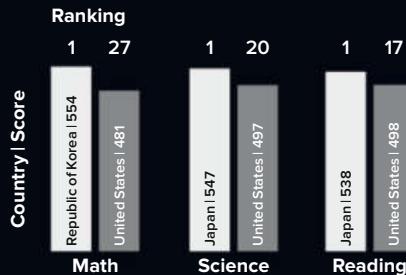
INVENT NO MORE

IGNORE YOUR HEART | SHOOT FOR AVERAGE  
THINK NEGATIVE | REACH FOR THE GROUND

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THE MESSAGE TO INVENTORS IS, "WHY BOTHER?" SO WHAT INVENTIONS  
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COPERS BEFORE THEY GET STARTED? WHOSE JOBS WILL GET SHIPPED  
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## Khan Do

# The guy behind an online learning juggernaut has started a small school in Silicon Valley. Can Salman Khan reinvent education again?

BY JASON TANZ

**SALMAN KHAN** sits at the head of a conference table, surrounded by about a dozen children, talking about Hitler. It's late June, nine months into the first year at Khan Lab School, Khan's educational R&D lab in Mountain View. At most schools, the students would be counting down the minutes until their summer vacation. But the Lab School eschews most of the traditional trappings of US education, including summer break. So the kids here don't seem particularly fidgety. Or at least not any more fidgety than your standard group of 9- to 12-year-olds sitting in a warm room analyzing the decline of the Weimar Republic.

Khan himself is the famed creator of Khan Academy, the online juggernaut that provides thousands of hours of free video tutorials and exercises to anyone with an Internet connection. Plenty of big-brained tech types—including the likes of

▲  
Salman Khan, founder of the Khan Lab School, photographed in Mountain View, California, in September 2015.



Bill Gates, Ann and John Doerr, and Walter Isaacson—have hailed Khan Academy as a breakthrough: world-class teaching unencumbered by space and time, an agile system that lets students learn at their own pace, the most compelling case yet for how technology might revolutionize education around the globe. Khan, an MIT grad and for-

mer hedge funder, has become a Silicon Valley celebrity, feted on *60 Minutes*, at TED, and in the pages of *WIRED*. "The world's best-known teacher," he has been called. "A true pioneer." "One of our heroes."

But a few years ago, Khan began arguing that videos weren't enough. They were supplementing traditional education, ▶

when the entire system needed to be rethought. He wrote a book called *The One World Schoolhouse* that spelled out his vision, one in which schools abandon outdated practices—like homework, daily schedules composed of distinct 50-minute periods, grades, and classes organized by age—and embrace radical new methods to prepare students for the post-industrial world. Khan argued that the traditional lockstep approach to education, in which students all learn the same material on the same schedule, is anachronistic and crude; kids who are capable of learning faster are compelled to slow down, while others are forced to move on before mastering a subject, dooming them to a lifetime of incomprehension. Instead of inspiring students to think creatively, classes are filled with soul-killing lectures and emphasize conformity and obedience over passion and individuality. “The old classroom model simply doesn’t fit our changing needs,” Khan wrote. “It’s a fundamentally passive way of learning, while the world requires more and more *active* processing of information.”

Khan was hardly the first to level this critique. Reformers from John Dewey to Carleton Washburne had made similar arguments for more than a century. But Khan suggested

that the digital revolution might finally enable a new model of education, more flexible, inspiring, and affordable than the current system. He proposed a school in which kids work at their own pace, picking up core skills via software like Khan Academy, with teachers tracking their progress and helping out as needed. Most of the day would be spent on creative projects, with kids working together across age groups. And the whole place would be suffused with a spirit of experimentation, with teachers testing out new ideas and collecting data to measure their efficacy. Khan admits today that many of those ideas were “theoretical” and “utopian.” But while those adjectives might seem like drawbacks in traditional education circles, they are irresistible to tech types with a penchant for philanthropy, some of whom eagerly fronted \$1 million to help Khan build his dream school.

For decades now, technologists have been attempting to reinvent the school system. But at least so far, most of these efforts have run afoul of the rigid bureaucracies, parental anxieties, and political minefields that define much of the US education debate. InBloom, a system for collecting and tracking student data, shuttered in the face of parental protests; Mark Zuckerberg’s \$100 million investment in Newark’s public school system evaporated without leaving much of a trace; and the Los Angeles Unified School District’s ambitious plan to give every student an iPad broke down amid finger-pointing. In a country where even textbook purchases, to say nothing of tougher math standards, can spark national screamfests, the idea that the US would sanely and thoughtfully reengineer its approach to education seems naive at best. Then again, it’s hard to fault parents and educators for their conservatism. Innovation is an inherently risky endeavor. The tech industry fetishizes failure—the millions of eggs that must be broken on the way to making a unicorn omelet. That may be fine for business models or user interfaces, but not so great when those eggs are your kids.

So now, instead of massive top-down attempts to cram innovation into the public school system,

some tech-minded parents and entrepreneurs are building their own alternatives. Home schooling has become a trend in the tech community; it’s “off the charts” at Google, Khan says. When it came time to educate his own children, Elon Musk hired a local teacher and built a 20-person school without

room education more flexible and individualized. “The Bay Area is the destination for educators who want to see early signs of what these new school models could look like,” says Brian Greenberg, CEO of the Silicon Schools Fund, a nonprofit that has backed the Lab School and other new schools.



Students at the new school are encouraged to think creatively and work in teams.

This may come across as the educational equivalent of on-demand laundry delivery—privilege couched in the language of disruption. And there’s certainly nothing new about well-off kids receiving expensive, bespoke education while the rest of the country wrestles with the unforgiving economics of public schooling. Khan acknowledges that for now,



Students can access 10,000 videos on the Khan Academy iOS app.

**Editor at large Jason Tanz** (@jasontanz) wrote about Jimmy Iovine in issue 23.09.

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RUSSELL WILSON  
SUPER BOWL CHAMPION

\*proven on 3 day beards

most of the students at his school come from relatively wealthy tech-industry families, but he says that his annual tuition of \$22,000 is much less than many private schools, especially considering that the school offers year-round classes and optional extended days. (He eventually aims to bring the

try and the world. His team is diligently recording and tracking every student's progress and sharing the findings with their parents and the staff, an open source approach to educational innovation. In this view, the Lab School kids are guinea pigs, the eggs in the omelet, willingly subjecting themselves to new

lic accolades. "I have a shout-out for Mary, because when no one would take me to the bathroom, Mary did," one student announces. "It showed conscientiousness and social intelligence." Another student adds, "I have a shout-out for Mishal for being a really good sport about going inside and about not eating with everyone else. It showed social intelligence, self-regulation, self-awareness, and conscientiousness." After each compliment, the entire student body waves their fingers and chants "faaaaantastic!"

It's the kind of Kumbaya moment that could easily occur in squishy-minded, confidence-boosting schoolrooms across the country, with one difference: Orly Friedman, the school's director, asks the students to add every remark to a Google form that tracks who delivered the praise, who received it, and which specific traits they called out. Over time, she says, she will have a detailed analysis of her students' character development.

This is a pretty good snapshot of the Lab School's overall approach to education—a touchy-feely surface that masks a rigorous fealty to tracking data about every dimension of a student's scholastic and social progress. Every week, students set their own academic goals—the level of math they hope to master, the amount of time they plan to dedicate to reading, and so on. Over the course of the week, they use Khan Academy and other self-directed educational software to try to accomplish those goals. Their headway is charted so that teachers can identify where they are struggling and offer assistance. The afternoons are usually given over to broad, real-world projects—during my visit, one group of students was charged with redesigning the classroom's library, a task that led them to draw maps, study taxonomy, and research barcode-scanning apps.

The class also picks an overall theme to explore over the course of eight weeks. Last term's theme, "endangered species," culminated in a carnival in which the students designed games based on their favorite threatened animals. Unlike many progressive schools, the Lab School is a firm believer in stan-

dardized testing—students are evaluated three times a year, the better to measure their progress and make sure the school is living up to expectations. "It's not acceptable for even one student in this school to not grow as expected," Khan says, "and hopefully all of them are growing two to three times as expected."

Khan has fantasized about starting a school like this ever since he was an undergrad. Indeed, even before Khan Academy became an international phenomenon—it now reaches 31 million students a month in some 190 countries in 36-plus languages—he began exploring meatspace brand extensions. In 2009, before he left his hedge fund job to devote himself full time to Khan Academy, he used his vacation time to run a summer camp for middle-school-aged kids, in which the campers mentored one another and worked together on big projects like building robots. In 2010, he began a pilot program with the Los Altos, California, school district. Instead of delivering lectures, five teachers had their students use Khan Academy to learn math at their own pace, then tracked their progress on a special dashboard.

Over the years, Khan had occasionally pursued the idea of starting a school, but any time he spoke



Pupils also work on independent projects and have a say in how classrooms are organized.

tuition down to the amount public schools spend annually to educate each student. It's also worth mentioning here that the Lab School is in the process of obtaining not-for-profit status, like Khan Academy.)

More to the point, his goal isn't just to build one fancy school but to develop and test a new model of learning that can be exported to other schools around the coun-

ideas that have never been tried before, then adapting and adjusting and trying again.

"This is a lab for establishing new theories that could affect the rest of the planet," Khan says. "The whole point is to catalyze change."

THE STUDENTS of Khan Lab School are back from lunch, standing in a circle, trading pub-

**It may seem touchy-feely on the surface, but software tracks every student's progress.**

# THE STYLE + FUNCTION GUIDE

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**1**

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**“We haven’t demonstrated all the elements of Sal’s dream. The school gives us that opportunity.”**

the website, it’s the book, it’s *The One World Schoolhouse*,” says Dan Benton, a board member who was among the school’s loudest proponents. “We haven’t demonstrated all the other elements of Sal’s dream, and I think the school gives us that opportunity.”

Khan’s startup mentality meant building the school extremely fast—and courting disaster at every step. They signed up 30 kids for the initial

cohort, mostly from families who worked at Khan Academy or knew someone who did, but warned them to have backup plans in case the whole thing fell apart. They didn’t have a space built to code for the school until August, weeks before they were due to open. (Google eventually leased them a couple of floors in a company-owned office park.) They had to push back the start date by two weeks. Meanwhile,

Khan was remodeling his house, and his wife had just given birth to their third child. “Honestly, I like to multitask, but there were nights when I did not sleep,” Khan says. “I would get up and wander the streets. ‘What am I doing?’”

But it all ended up coming together. “I probably used some of my capital,” Khan says. The city of Mountain View granted permission for them to open a school in a space

### A DAY IN THE LIFE

**Like a true startup, Khan Lab School constantly changes its schedule to accommodate evolving workflow and logistical demands. Different age-groups follow different self-paced lesson plans, but here’s an example of a day at the Lab School.**

—VICTORIA TANG



to anyone about it, he came away discouraged. Real estate in Mountain View was prohibitively expensive, and the liability insurance alone presented a massive headache—to say nothing of all the usual bureaucratic hurdles from local government. But in the summer of 2013, Khan began to consider education options for his then 4-year-old son. That same year, Khan ran his first summer camp for younger kids, and at the end of it one of the parents begged him to start a school. “It was like, OK, if we’re ever going to start a school and we want our own kids to be in it, it’s now or never,” he says. “Everyone will tell you that starting a school’s a crazy thing, don’t even try. And we were like, well, let’s at least try.”

Khan initially figured he would start a homeschooling cooperative with about 10 families, but when he brought the idea up to the Khan Academy board, several members encouraged him to think bigger. “The vision of Khan Academy isn’t

like Lexia and LightSail to assess students’ reading levels and work with individuals on problem areas.

more direct instruction, while older students might work on a collaborative engineering project.

**1:30–12**  
**Inner Wellness**  
Students improve their mental well-being by practicing mindfulness.

**12–12:45 pm**  
**Lunch**

**12:45–1**  
**Afternoon Meeting**

Another schoolwide gathering for announcements and updates.

**1–2:30**  
**Math/Computer Science Lab**

Using videos from Khan Academy, students practice skills at their math level. Younger students receive

**2:30–3**  
**Outer Wellness**  
Students participate in physical fitness activities, including gardening and playing sports like field hockey, soccer, and Ultimate Frisbee.

**3–4**  
**Cleanup, Read Aloud, Flexible Pick Up/Recess**

**4–6**  
**Studio Time/Pick Up**  
During this optional period, students work on their own without direct supervision, though the staff is available for help.

**9–9:15 am**  
**Morning Meeting**  
A daily all-school meeting where students learn about things like current events, view the work of their fellow classmates, and focus on relationships.

**9:15–9:45**  
**Advisory**  
Students break out into

cohorts sorted by age. They attend one-on-one meetings with advisers to set personal goals. (One ambitious 12-year-old hopes to launch a small-scale NGO.) Some days include “Goal Studio” time to work on these independent passion projects.

**9:45–10:45**  
**Literacy Lab, Part 1**  
Teachers cover all the essentials, from developing main ideas to composing blog posts.

**10:45–11**  
**Morning Break**

**11–11:30**  
**Literacy Lab, Part 2**  
Instructors use digital tools



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zoned for offices. He hired a couple of other teachers who already used Khan Academy, were fans of *The One World Schoolhouse*, and were eager to explore a new approach to education. On September 15, the school opened for its first day of class with 30 students.

**ONE OF THE TENETS** of the Lab School is that kids should play an active role in designing their own education. This means that a *lot* of the school day is spent discussing the school itself. While I was there, kids put in hours designing new storage space to stow their backpacks, devising a new meal system, and figuring out how to incorporate the new classmates that would be arriving in the fall, when the school doubles in size to 60 and welcomes more middle-school-aged students. They often sounded more like tech

## The point is to refine a model that other educators can build on to change education nationwide.

entrepreneurs than elementary students, talking about things like “rapid prototyping” and “design thinking.” On more than one occasion, I heard them begging to spend more time on math and reading.

The beginning of the summer term was also a chance to take a sober look at the year to date. Over the year, Friedman had sat with students and recorded how much time they were spending on various activities. After looking at the data, the Lab School team realized that students weren’t focusing enough on social studies. They also felt that they needed to do a better job grouping students by levels of independence, not just academic level, so Friedman had devised a new set of criteria to measure things like time management, self-knowledge, and focus. They were also revisiting the reading software their students

were using and were about to start a trial in which different groups of students were put on three different programs to see which one was most effective.

By this point, the kids were probably used to being experimented on. The Lab School has thrown its doors open to outsiders, letting them test out their new ideas or products on a captive group of students. While I was there, a couple of UX designers from Khan Academy came down to see how some of the kids responded to a reorganization of the homepage. The stools and tables were donated by a furniture company, which in exchange gets to observe how the students interact with them. Mallory Dwinal, who is starting a new school in the Bay Area, has tested out some sample lessons on the students. “It’s an engineering mentality,” Khan says.



"You start with a solid baseline, but then you're always willing to observe, measure, and iterate, and through those improvements you come up with something amazing. It worked for the car industry, computers, software. Can we do that with the school?"

The point here isn't just to build a better school but to refine a model that other educators can build on—to change education across the country and the world. That's why Khan is setting up the Center for Learning Innovation, a network to enable similar-minded schools to share their projects and findings. But ultimately, most of Khan's supporters say, the best way to promote this new style of learning is to create a great school with amazing results that parents, teachers, and administrators will naturally want to emulate. "Convincing schools to

make a change like this is difficult," Benton says. "The only way to do it is to prove it."

Indeed, *not* everything is working, and the school can fall prey to some of the devastating setbacks that befall any fast-moving startup. In July, shortly after my visit, an award-winning teacher Khan had recruited from Virginia submitted his resignation—a surprise to Khan and the rest of the team. "This really is a laboratory, and like Thomas Edison or anyone else, we're going to have some failures," says Christopher Chiang, a recent hire who was already slated to build out the Lab's middle school program. "I joined Sal not because he has all the answers, and not because I have all the answers, but because somebody needs to try this and learn what the mistakes are."

But most of the parents I spoke with—many of them with ties to the tech industry—were happy with the move-fast-and-break-things approach to education. In fact, they said they were most drawn to the idea that everything *wouldn't* be perfect, that their kids would be able to experience the school as it's being born and refined and tweaked. "My daughter is not naturally experimental or risk-taking," says Sangeeta De Datta. "They're throwing everything against the wall here, and that fosters her ability to go out and explore other things."

I suggested to Khan's team that, by those criteria, the school might become less attractive over time, as the team gets a better sense of what's working and loses some of its spirit of startup experimentation. But they insisted that the

process would never conclude. The experimentalism isn't just a means to an end—an attempt to discover the perfect school. The experimentalism *is* the end. "They've done a great job of building a culture that says, 'We're here to innovate, and if something isn't working, it's your job to say so,'" Dwinal says. "It turns a liability of innovation into an incredible gift for students. They're teaching them how to work in the 21st century workplace." In other words, sometimes you don't break eggs to make a perfect omelet. Sometimes, the whole point is just breaking the eggs. ■



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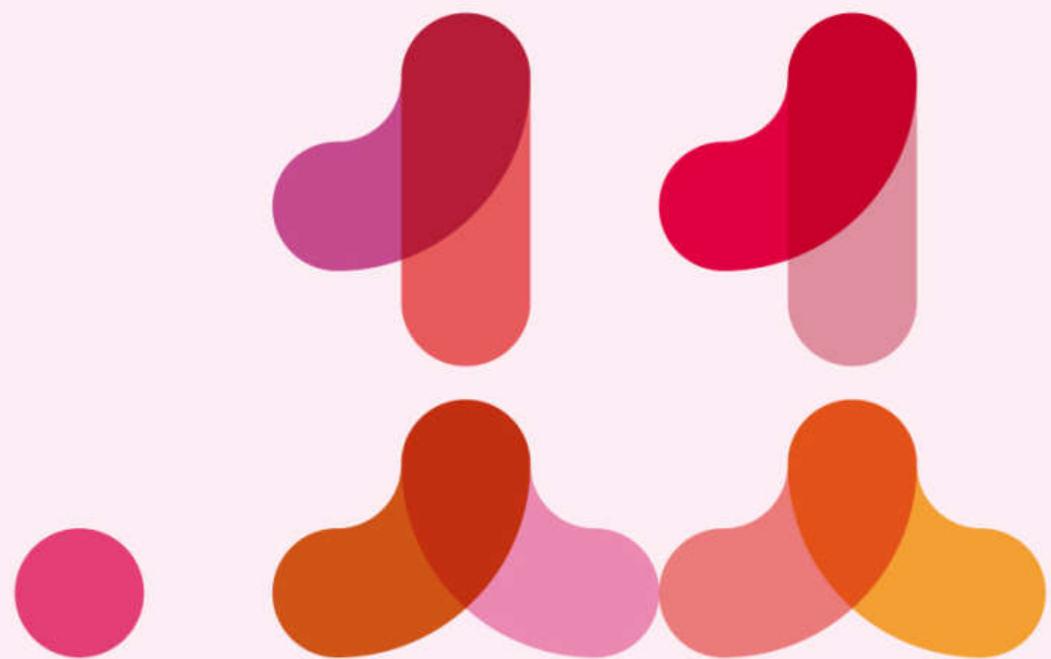


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# The Ball Is in Your Court

**Back in 2008**, when I was competing in the US Open, I would keep little “match books,” where I’d write affirmations to myself and read them during matches. It worked pretty well. But before long I found an even better way to inspire myself: I started using affirmations as the passwords to my phone and my computer. (No, I’m not going to tell you what my current affirmation is!) You should try it. You’ll be surprised how many times a day you log in and have an opportunity to trigger that positivity. I love that I can use technology that way.

Here’s one of the affirmations I gave myself when I was younger: “I will work in Africa and help kids and help people.” And I did. I opened a school in Kenya in 2008 and a second in 2010. Now, sometimes in Africa they send only the boys to school. So we had a strict rule that our schools had to be

at least 40 percent girls. It was impossible to get 50-50 boys to girls, and we really had to fight for 60-40. But we got it.

Equality is important. In the NFL, they have something called the Rooney rule. It says that teams have to interview minority candidates for senior jobs. It’s a rule that companies in Silicon Valley are starting to follow too, and that’s great. But we need to see more women and people of different colors and nationalities in tech. That’s the reason I wanted to do this issue with WIRED—I’m a black woman, and I am in a sport that wasn’t really meant for black people. And while tennis isn’t really about the future, Silicon Valley sure is. I want young people to look at the trailblazers we’ve

BY SERENA WILLIAMS

to online harassment, including my favorite, Send-a-Puppy, where you’d send a digital doggy to support someone who’s being harassed. And we can champion efforts that get kids interested in computers, efforts like Kimberly Bryant’s Black Girls Code (see page 116).

Nothing like Black Girls Code existed when I was growing up. (And I know what it’s like to be interested in a field where the other kids don’t look like you.) So I think we’re making progress. But we can keep working even more to increase equality—whether it’s making sure to interview black candidates for tech jobs or standing up to cyberbullying or making sure that our technology is designed by all kinds of people. Eventually we’re going to make the world better. For everyone. And hopefully my next school will be 50-50. —As told to Sarah Fallon

And when we’re not talking, we can get coding. Adria Richards (see “Take Back the Net,” page 108) has suggested solutions



# Geena Rocero

Rocero is the founder of the advocacy group Gender Proud.

Back in 2003, I was living in San Francisco and dating a guy. Soon enough we found ourselves in the bedroom. This, of course, meant that I needed to talk with him about my gender history. I was young and still finding myself and said, "I have to tell you something." I then explained I had been born a boy, even though, in truth, I never felt like a boy. I felt a sense of shame around the whole thing. He didn't react well. "Come on, I'll drive you home," was his quick reply. Let me tell you, that was one silent ride. Right before he dropped me off, he looked over at me and said, "That's why your knees are too big." It was awful. ¶ A couple of years later, I moved to New York City by myself and started working to become a model. Slowly, that experience—of being alone in a large metropolis, of getting rejected for modeling jobs and having to go right back out and try again, of eventually starting to succeed—developed my character. I gradually became more con-

fident in who I was and less concerned with the biases of others. I stopped apologizing. ¶ In 2007 I began dating a new guy. This time when I felt it necessary to discuss my gender history, I didn't let myself do it from a place of shame. Instead it came from a place of pride and power. I said, "Look, I really like you and I want to take this relationship to the next level, but I have to share with you what I've been through." I then explained how I had been assigned boy at birth but never felt that way. How I grew up poor in the Philippines and emigrated to the US and had to go through the process of discovering who I was. I owned my own experience. ¶ The reaction this time was differ-

ent. "That's the most inspiring story I've ever heard," he said. "I love you no matter what you've been through." It brought us closer. ¶ To this day, when I talk about my gender, I think of it as *sharing* my experience. If I say that I need to *tell* somebody something, there's an implication that I've been lying to them. But sharing my experience gives me agency. This small change in approach accompanied a change in how I view myself. I am proud of the woman I am, and I won't let anyone change that. —As told to Robert Capps

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## Trailblazers TRANSGENDER MODEL

HAIR BY LEAH GEZELLE QUALES; MAKEUP BY CETINE





# Mary Meeker

Trailblazers

## VENTURE CAPITALIST

“

*Meeker is a partner at Kleiner Perkins.*

On Wall Street at Morgan Stanley in the early '90s, I thought I would succeed or fail solely on my own merits. That's the way it worked when I was a kid, playing sports

like tennis and basketball while growing up in Indiana. Wall Street was an intense, male-dominated place. But I didn't think much about it at all. It was what it was. ¶ I later moved to California, joining the venture capital firm Kleiner Perkins. We invested in Square, the online-payments company cofounded in 2009 by Jack Dorsey, who was also one of the founders of Twitter. I serve on Square's board, and I took notice of how Jack built the management team. In 2014, Square recruited Alyssa Henry from Amazon to run engineering. She was the third woman on an eight-person executive team, and I saw firsthand how the relationships of these three women quickly evolved to be very collaborative and powerful. It was exciting to watch. ¶ While

□ 9 2

sitting in a board meeting, I suddenly appreciated that Jack's efforts mirrored what I had experienced early in my career at Morgan Stanley, after a small group of senior execs worked to actively recruit and develop female leaders. They didn't just find the right talent—they ensured we got to know one another in business and personal settings and developed trust. They set a tone where we were encouraged to take calculated risks, with an implicit understanding that someone had our backs. ¶ What I've learned? Success is not random. Leadership matters. The words "I have your back" can be magic when they are backed up with actions. An environment of trust can bring out the best in people.



## CIVIL RIGHTS ACTIVIST



MEEKER: GROOMING BY RAMEE HURWITZ/ARTIST UNITED

# ■ DeRay Mckesson

*Mckesson (center) is one of the most visible faces of the Black Lives Matter movement.*

As people of color, we have always faced issues of erasure: Either our stories are never told

or they're told by everybody but us. But in this moment we've become the unerased. Because of Twitter, Facebook, Vine, and Instagram, we're able not only to push back against dominant-culture narratives, but also to talk to each other differently. ¶ I met Johnetta "Netta" Elzie (at right in photo) on Twitter. She and I knew each other digitally before we knew each other in person, and we trusted each other there first. And now we're together all the time. ¶ There was this one night when Netta was going to a protest in St. Louis—the night VonDerrit Myers was killed—and I was not in town. We were on the phone as she was heading to the protest. We didn't know what was going to happen, and out of the blue she just started sending me all the passwords to all of her accounts, so I would have that information in case something happened to her. That's how close we were and are. ¶ Over the past year, we've seen people across the country use technology and social media to build relationships, relationships that have been essential to pressing for change and surfacing stories on all levels. In this moment, our access to information—and to each other—is unparalleled.

—As told to John Gravos



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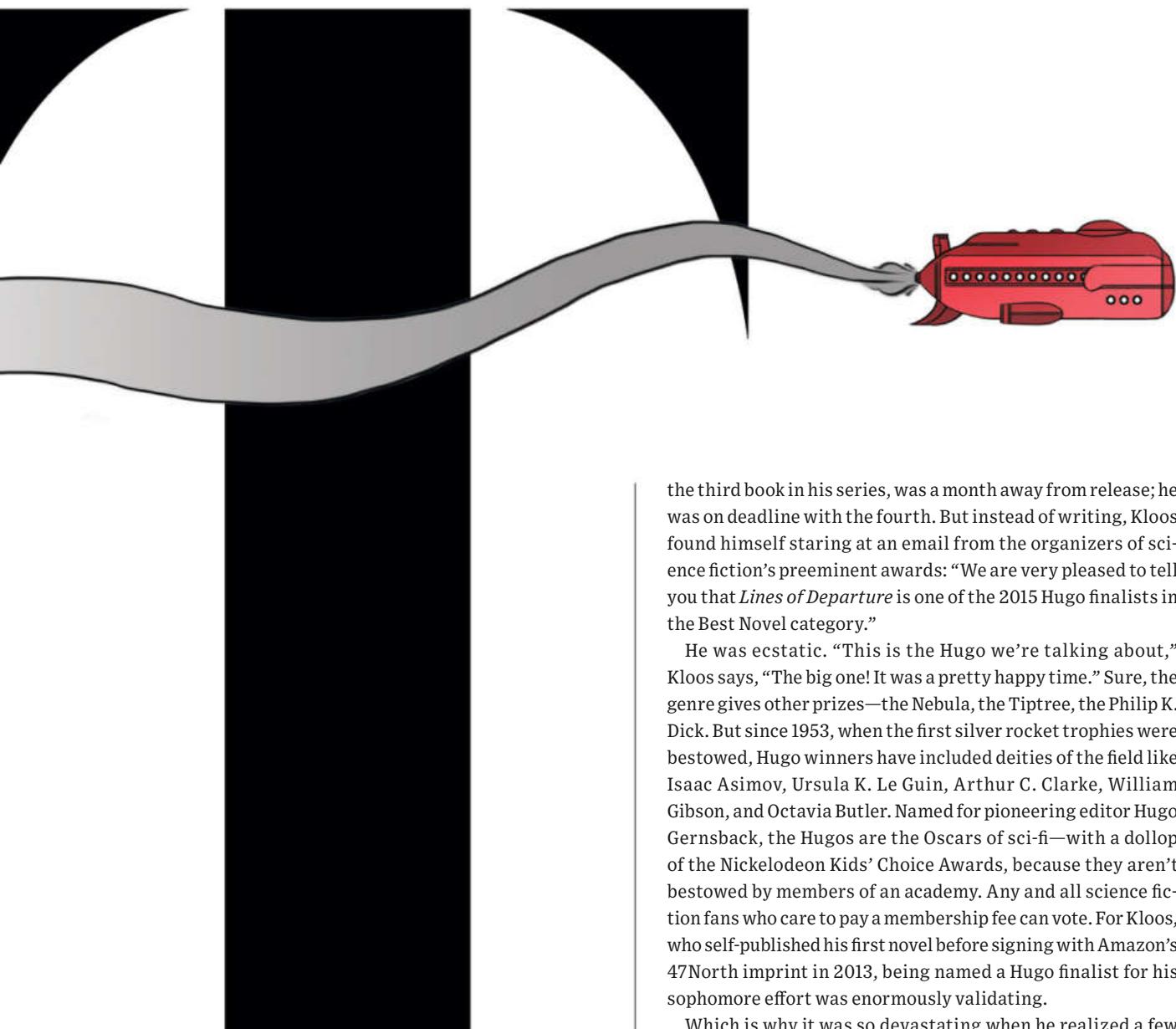
# of the Words

A battle over diversity is raging in the world of science fiction. And it's a battle for the soul of all popular culture.

by Amy Wallace

• Kristina Collantes





**The year is 2108**, and things aren't going so well for Team Humanity. Earth is so overcrowded that people live in hive-like concrete cubicles called Public Residence Clusters and subsist on reconstituted soy. Things aren't much better 30 light years away, in Earth's run-down Outer Colonies. No wonder the hero of Marko Kloos' first novel, *Terms of Enlistment*, joins the space-going military to escape those terrestrial slums. By Kloos' second book, *Lines of Departure*, his protagonist is half a decade into a career that includes vicious interstellar conflict with an indestructible alien species. Think Robert Heinlein's *Starship Troopers* with maybe a dash of James Cameron's *Aliens*.

On March 19, 2015, Kloos, a former noncommissioned officer in the German military who now lives in rural New Hampshire, sat down at his computer in his tiny study. *Angles of Attack*,

the third book in his series, was a month away from release; he was on deadline with the fourth. But instead of writing, Kloos found himself staring at an email from the organizers of science fiction's preeminent awards: "We are very pleased to tell you that *Lines of Departure* is one of the 2015 Hugo finalists in the Best Novel category."

He was ecstatic. "This is the Hugo we're talking about," Kloos says, "The big one! It was a pretty happy time." Sure, the genre gives other prizes—the Nebula, the Tiptree, the Philip K. Dick. But since 1953, when the first silver rocket trophies were bestowed, Hugo winners have included deities of the field like Isaac Asimov, Ursula K. Le Guin, Arthur C. Clarke, William Gibson, and Octavia Butler. Named for pioneering editor Hugo Gernsback, the Hugos are the Oscars of sci-fi—with a dollop of the Nickelodeon Kids' Choice Awards, because they aren't bestowed by members of an academy. Any and all science fiction fans who care to pay a membership fee can vote. For Kloos, who self-published his first novel before signing with Amazon's 47North imprint in 2013, being named a Hugo finalist for his sophomore effort was enormously validating.

Which is why it was so devastating when he realized a few weeks later that his short-listing was, in his eyes, a sham. It turned out that activists angered by the increasingly multicultural makeup of Hugo winners—books featuring women, gay and lesbian characters, and people and aliens of every color—had gamed the voting system, mounting a campaign for slates of nominees made up mostly of white men. Kloos, who is white, says he was sickened to see his name listed. "I knew right away I was going to have to sit down and write an email and reject the nomination," Kloos says. To his publisher, whose authors had never gotten a Hugo nod, Kloos was blunt. "This is the kind of stink," he said, "that doesn't wash off."

**It is the early 21st century**, and things aren't going so well for Team Humanity. Back in April, when the mainstream press first started reporting on the attempt to hijack the Hugos, few outside the field cared. The edging out of fan-favorite authors who were women and people of color was unfortunate and ugly, but it seemed confined to one of literature's crummier neighborhoods—nerd-on-nerd violence.

But like the sound of starship engines, the Hugos don't exist in a vacuum. "Gamergate" spawns rape threats aimed at women who have the temerity to offer opinions about videogames. The leading representatives of mainstream political parties build platforms around fear of Muslims and Planned Parenthood. A certain strain of comic book fan goes apoplectic when Captain America gets replaced with a black man and Thor gets replaced with a woman. (When Thor once got replaced by a frog, no one uttered a peep. Or a rabbit.) *Mad Max: Fury Road*, in which Charlize Theron seeks to rescue a bunch of women from sex slavery and Max is more of a sidekick, drove the so-called mens' rights movement into a froth.

It looks an awful lot like a counter-revolution—a push by once-powerful forces attempting to reclaim privileged status. Nowhere is this revanchism playing out more vividly than in the culturally potent literary sub-genre of science fiction.

The three white men who led this movement broke no rules when they selected and promoted their Hugo nominees. They took advantage of a loophole in an arcane voting process that enables a relatively small number of voters to dominate. First a group calling itself the Sad Puppies posted a slate of suggested candidates to a

well-trafficked blog (a slate that included women writers as well as men). Then, a day later, a more militant wing, the Rabid Puppies, posted another slate that captured most of the original writers and added several more—with a directive that people vote it without deviating, creating an unstoppable bloc. Now, all the various Puppies insist they're trying to expand, not reduce, diversity—at least as they define the word. They say the Hugos have gotten snobby and exclusionary. The Puppies hate the politicization of a genre they love and want to return it to its roots: exploration of the unknown and two-fisted adventure.

Of course, like all fiction, science fiction is inherently political. Mary Shelley's *Frankenstein*, arguably the first sci-fi novel, was a monster story that explored the ethics of technological advance and the responsibilities of parenthood. Sci-fi uses a fantastical toolkit to take apart the here and now—from H. G. Wells' novella *The Time Machine* to Paolo Bacigalupi's *The Windup Girl*, a cautionary tale of climate change. So trying to crush diversity of authors, of characters, of stories, of themes in sci-fi crushes the whole point. Which is perhaps the main reason to worry about Puppygate: Sci-fi that accommodates only one future, one kind of politics, and one kind of person just isn't doing its job.

That's partially why so many authors with literary aspirations come sniffing around the genre so often. It lets them wrap ethical and cultural issues in highly readable plots. And now that movies are dominated by space and superheroes, television by dragons and zombies, books by plagues and ghosts, science fiction isn't a backwater anymore. It's mainstream.

Over the summer, as the 73rd World Science Fiction Convention—where the Hugo winners are announced—approached, the final balloting became a referendum not only on the future of the genre but on the future of the future. "It's one award," N. K. Jemisin, the fantasy writer and two-time Hugo nominee, tells me, "but it's a symbol of a battle for the zeitgeist."

**"I love chaos. I wanted to leave a big, smok-ing hole where the Hugos were."**

**It's the year 1939**, and things aren't going so well for the humans at the first World Science Fiction Convention, or Worldcon. About 200 fans have gathered in Caravan Hall at the New York World's Fair and almost

## The Books and Stories That Sparked a Culture War

by Lexi Pandell



### "The Water That Falls on You From Nowhere"

John Chu

After water begins raining down on liars, a gay man comes out to his traditional Chinese family.



### The Three-Body Problem

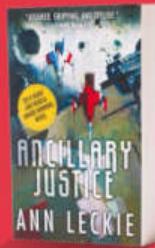
Cixin Liu

The first-ever Chinese nominee beat out the Puppies' slate.

### Ancillary Justice

Ann Leckie

The only survivor of a destroyed starship seeks revenge in a far-future society that can't see gender.



immediately started bickering. The bulk of the assembly suspects some members of a splinter group known as the Futurians—including pre-legendary Isaac Asimov and Frederik Pohl—of being communists plotting to disrupt the proceedings. Worldcon grantees bar them from entry. Asimov, characteristically, sneaks in.

Undeterred, the Futurians circulate a pamphlet that warns attendees of being “pounded into obedience by the controlling clique.” The pamphlet continues, “It is for you to decide whether you shall bow before unfair tactics and endorse the carefully arranged plans of the Convention Committee. Beware of any crafty speeches or sly appeals. BE ON YOUR GUARD!”

The point is, sci-fi and fantasy fandom was born in struggle over who owned the genre. The Sad Puppies and the Rabid Puppies aren’t even the first to campaign for the award. In 1987 the Church of Scientology successfully lobbied to get L. Ron Hubbard’s novel *Black Genesis* nominated for a Hugo. It finished sixth out of five nominees, defeated by “No Award.”

This time around, the leaders of the Puppies movement are sci-fi authors. All are past Hugo nominees, though none of them has ever won. Larry Correia, a 40-year-old Utah accountant, former gun store owner, and NRA lobbyist turned novelist, created the Sad Puppies three years ago. He came up with the name after seeing an ASPCA ad featuring Sarah McLachlan and forlorn canines staring into the camera. “We did a joke based on that: that the leading cause of puppy-related sadness was boring message-fic winning awards,” he says, laughing. Correia also explains that initially, in that first campaign, “our spokesman was a cartoon manatee named Wendell. Wendell doesn’t speak English. You can see we kept this really super serious, right?”

But Correia had some serious complaints. He felt that the Hugos

had become dominated by what Internet conservatives call Social Justice Warriors, or SJWs for short, who value politics over plot. When Correia unleashed the Sad Puppies campaign for the second time, in 2014, two particular Hugo contenders really set his comrades off. One, a short story by John Chu called “The Water That Falls on You From Nowhere,” depicts a gay man who decides to come out to his traditional Chinese family after water starts falling from the sky on anyone who tells a lie. And in Ann Leckie’s debut novel *Ancillary Justice*, most of the characters in a far-future galactic empire do not see gender, which Leckie conveys by using only female pronouns.

Correia’s *Warbound* lost to Leckie’s novel at the 2014 Hugos. This year, the Puppies got his *Monster Hunter Nemesi*s a nomination, but he turned it down. “I very specifically don’t want this to be about me,” he says, “and I didn’t want them to be able to make it about me.” Correia and Brad Torgersen, a 41-year-old chief warrant officer in the Army Reserve who took over the third Sad Puppies campaign this year, tell me they’re not racist or sexist or antigay. They just want sci-fi to be less preachy and upper-crusty and more fun. Torgersen calls his books blue-collar speculative fiction; on the phone from the Middle East, where he is currently deployed, Torgersen laments what he calls “the cognitive dissonance of people saying, ‘No, the Hugos are about quality,’ and then at the same time they’re like: ‘Ooh, we can vote for this author because they’re gay,’ or ‘Ooh, we’re going to vote for this author because they’re not white.’”

Torgersen often notes in interviews that he’s been married to an African-American woman for 21 years, so “I don’t need some know-it-all to come lecture me about race stuff,” he tells me. Torgersen says the Hugos are beset by identity politics—and are the poorer for it: “When people go on about how we’re anti-diversity, I’m like: No. All we’re saying is storytelling ought to come first.”

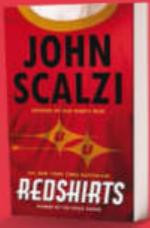
Ah, but of course that’s not all the Puppies are saying. At least, not the Rabid faction. Their leader is a self-described libertarian blogger named Theodore Beale who goes by the pen name Vox Day—loosely, “the Voice of God,” though he says the meaning of the name is more complex. He’s a 47-year-old former rocker (he



### **The Hundred Thousand Kingdoms**

N. K. Jemisin

An outcast from a matriarchal society seeks revenge for her mother's death and fights to inherit the throne.



### **Redshirts**

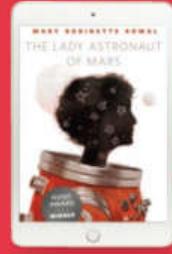
John Scalzi

*Star Trek* is kind of real, and kind of dumb.

### **"If You Were a Dinosaur, My Love"**

Rachel Swirsky

The narrator fantasizes about a lover turning into a T. rex.



### **"The Lady Astronaut of Mars"**

Mary Robinette Kowal

An elderly female astronaut longs to return to the Red Planet.



### **Chicks Dig Time Lords**

Various

Women writers, academics, and actors discuss their love for *Doctor Who*.



wrote songs for Psykosonik) and is the son of a wealthy Minnesota entrepreneur and Republican leader currently in jail for tax evasion. Beale speaks five languages, he tells me, and one of his children “is the youngest male published author in history.” The book came out when the boy was 6.

Beale also says that he’s not white. “I’m Native American. My great-grandfather rode with Pancho Villa, and I get to do that—make that claim—according to the rules of SJW.” When I ask how much Native American blood he has, he says, “I’m not going to go into details, but I will say that it is so significant that even my kids qualify for tribal membership. I’m a mix. I mean, I’m also considered a Mexican. I have the genetic analysis.”

Based on his voluminous writings, Beale—who writes fiction, edits for a small publisher called Castalia House, and designs games—opposes racial diversity, homosexuality, and women’s suffrage. Speaking by phone from his home in Northern Italy, Beale quibbles with that analysis. For example, he says he doesn’t oppose all women’s suffrage, just women voting in a representative democracy. The reason: “Women are very, very highly inclined to value security over liberty” and thus are “very, very easy to manipulate.” He favors direct democracy—and, obviously, men.

Having a conversation with Beale feels sort of like walking around a room designed by M. C. Escher. It turns in on itself in unexpected and at times dizzying ways. A sampling: When I ask him why he once called Jemisin, who is black, an “educated,

but ignorant half-savage” on his blog, he says it wasn’t because of her race. Then he launches into an explication of what he calls “new” genetic research, which he says he doesn’t expect very many people to understand.

When I point out that he was intentionally baiting a person of color with a term that has racial overtones, his answer sounds positively gleeful. “I’m calling her a half-savage because I know it’s going to offend the crap out of her,” Beale says. “She’s going to run around screaming ‘Racist! Racist!’ for the next 10 years.” A beat, and then he adds: “I don’t consider all black people to be half-savages. I mean, some people are. Here in Europe, for example, we have actual proper Africans, not African-Americans. This leads to problems, like people shitting on top of the closed toilets. They don’t know how to use indoor plumbing, OK? This is not civilized behavior.”

Torgersen says he believes Vox Day is a character Beale plays. “It’s performance art, like Andy Kaufman. He’s Darth Vader breathing heavily into your phone. He wants people to be enraged and flipping out and tearing their hair and completely losing their minds. And he gets that every single time.”

Beale—whose slate got five of Castalia House’s writers and editors, including himself, on this year’s Hugo ballot—acknowledges his rogue reputation. “I love chaos,” he says. “I wanted to leave a big, smoking hole where the Hugo Awards were. All this has ever been is a giant ‘fuck you’—one massive gesture of contempt.”

**“Science fiction is not actually the literature of the future. It’s the literature of the present.”**

**It is ... well, some vaguely medieval** period in a land with teleportation and magicians called scriveners, and things aren't going so well for the brown-skinned, matriarchal warriors in the barony of Darr, one of many territories in the world of N. K. Jemisin's debut novel, *The Hundred Thousand Kingdoms* (first in a trilogy, of course). To obtain birth control, poorer people buy illegal, bootleg spells called sigils that last only a month, or they risk sterilization or death by trying to apply sigils to themselves. The Darre people have also managed to enslave several of their gods. And the gods? They're pissed. Like Tolkien's Middle-earth, Jemisin's world is what's called in the trade a secondary world, "but it's not meant to emulate anything that looks like our world or any of our cultures," she says. And that, of course, is part of the point.

When Jemisin was in elementary school in Mobile, Alabama, she noticed that no one in any of the stories in the sci-fi section of her local library looked like her. "I had picked up the fact that science fiction and fantasy was about white people," she says. So the description of the protagonist in Octavia Butler's novel *Dawn* hit Jemisin like a lightning bolt. "I remember the mention of her family name, and the fact that she'd married a Nigerian man, and people's reactions to her," she says. "I suddenly had this 'Oh, my God, she's black' moment." Jemisin came by her confusion honestly: The cover of the 1987 edition featured a white woman with black hair. In later editions, the illustration was changed to a black woman.

Women and people of color have always written science fiction—Butler, Le Guin, Anne McCaffrey, Samuel R. Delany, Margaret Atwood, and many more. They've made comic books and videogames and movies too. But today these properties aren't alt-texts anymore. As science fiction has become mainstream, the genre has gotten more diverse. Major comic book publishers are foregrounding women and people of color. The casts of the new *Star Wars* movies have their diversity cranked to It's a Small World levels.

So you might be asking yourself: Isn't there room for everybody under the science fiction tent? You guys over there can keep reading hard military sci-fi where the physics of deceleration from 0.5c is a plot point. And you guys over here can read about a transgendered person with dark skin and epicanthic folds pondering the existential implications of sex with an AI.

But here's the honest truth, as Jemisin has eloquently blogged: White male authors have long enjoyed unacknowledged privileges. Even today, their books are more likely to get published, more likely to be reviewed (usually by white men), and more likely to get those reviews in prominent, mainstream publications—even though, Jemisin says, the audience for sci-fi and fantasy books includes so many women and people of color.

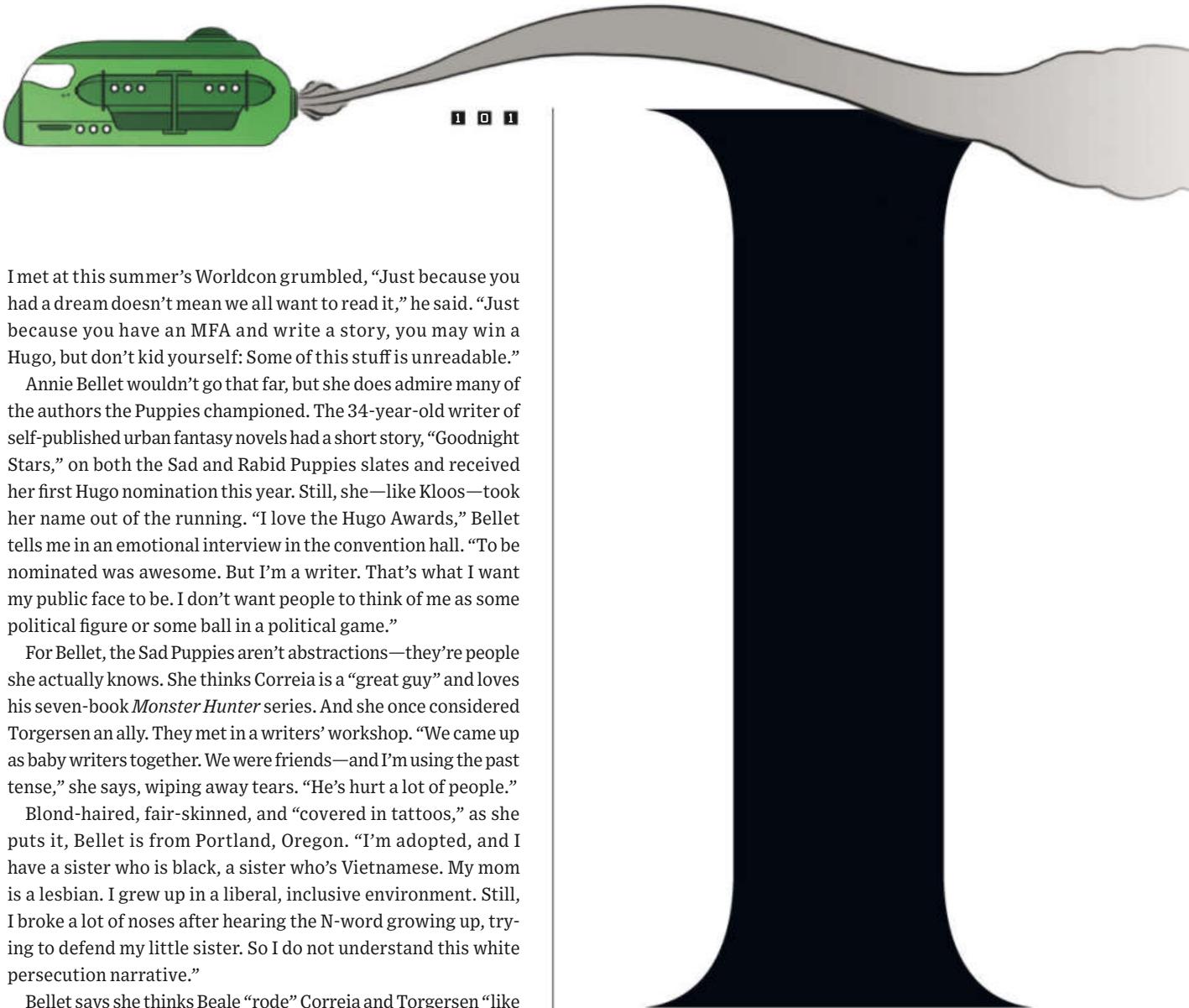
Jemisin recently published her sixth novel—*The Fifth Season*—which garnered her first-ever review, a rave, in the *New York Times* Sunday books section. The book explores themes of oppression that are not foreign to her; indeed, Jemisin has gone to battle

with Beale. "He dances up to the line and tries very carefully not to cross it," she says. "He simply says, 'This person is not human,' then opens his comments section and doesn't stop anyone when they start saying, 'We should run a train on that bitch.' This is the standard modus operandi for white supremacists who don't want to go to jail."

Despite all the bile sprayed at her (the "train" threat is a euphemism for gang rape), Jemisin still believes that her chosen genre has a lofty purpose. "Science fiction is not actually the literature of the future," she says. "It's the literature of the present, viewing the future as allegory."

Yet amid the Puppies debate, something else is going on, too: In a genre defined by curiosity, by the question "What if?" and by yearning for a sense of wonder, some fans acknowledge that modern science fiction can feel infected with a certain academic torpor—if not outright self-indulgence. As one Sad Puppy supporter

**"Nerd culture brings everyone together. People don't care what you look like."**



I met at this summer's Worldcon grumbled, "Just because you had a dream doesn't mean we all want to read it," he said. "Just because you have an MFA and write a story, you may win a Hugo, but don't kid yourself: Some of this stuff is unreadable."

Annie Bellet wouldn't go that far, but she does admire many of the authors the Puppies championed. The 34-year-old writer of self-published urban fantasy novels had a short story, "Goodnight Stars," on both the Sad and Rabid Puppies slates and received her first Hugo nomination this year. Still, she—like Kloos—took her name out of the running. "I love the Hugo Awards," Bellet tells me in an emotional interview in the convention hall. "To be nominated was awesome. But I'm a writer. That's what I want my public face to be. I don't want people to think of me as some political figure or some ball in a political game."

For Bellet, the Sad Puppies aren't abstractions—they're people she actually knows. She thinks Correia is a "great guy" and loves his seven-book *Monster Hunter* series. And she once considered Torgersen an ally. They met in a writers' workshop. "We came up as baby writers together. We were friends—and I'm using the past tense," she says, wiping away tears. "He's hurt a lot of people."

Blond-haired, fair-skinned, and "covered in tattoos," as she puts it, Bellet is from Portland, Oregon. "I'm adopted, and I have a sister who is black, a sister who's Vietnamese. My mom is a lesbian. I grew up in a liberal, inclusive environment. Still, I broke a lot of noses after hearing the N-word growing up, trying to defend my little sister. So I do not understand this white persecution narrative."

Bellet says she thinks Beale "rode" Correia and Torgersen "like ponies. I told Brad that. He said, 'Just because we're on the freeway in different cars heading the same direction doesn't mean we're together.' I said, 'Dude, you're in the same car, and Vox Day is driving.' He doesn't get it. It makes me so sad."

She doesn't think Beale even read her short story. Bellet was on the Sad Puppies slate her onetime friends had promulgated, which he mostly copied. "I'm everything Vox Day doesn't like—which I consider a badge of honor," she tells me. "I'm a queer female writing about shape-shifters—that fantasy 'crap' that's not 'real' science fiction." Here's the thing she thinks Beale doesn't grasp, she says: "Nerd culture brings everybody together. People don't care what you look like. If you want to be a black Khaleesi, go for it!"

**It is August 2015**, and things are looking up for Team Humanity. Or are they? A record 11,700-plus people have bought memberships to the 73rd World Science Fiction Convention in Spokane, Washington, where the Hugo winners are soon to be announced. A record number have also forked over dues of at least \$40 in time to be allowed to vote, and almost 6,000 cast ballots, 65 percent more than ever before.

But are the new voters Puppies? Or are they, in the words of *Game of Thrones* author George R. R. Martin, "gathering to defend the integrity of the Hugos"? Just before 8 pm on August 22, in a vast auditorium packed with "trufans" dressed in wizard garb, corsets, chain mail, and the like, one question is on most attendee's minds: Will the Puppies prevail?

The evening begins with an appearance by a fan cosplaying as the Grim Reaper, and that turns out to be an omen for the Puppies. By evening's end, not a single Puppy-endorsed candidate takes home a rocket. In the five categories that had only Puppy-provided nominees on the | **CONTINUED ON PAGE 126**

# Jen Welter

Trailblazers

PRESEASON  
COACH FOR  
THE ARIZONA  
CARDINALS

1 0 2



“  
Welter was a training-camp and preseason intern for the Arizona Cardinals, working with inside linebackers. She's the first woman to coach in the NFL.

I grew up in Vero Beach, Florida, where football is kind of a religion. The whole town shuts

down for games, and we would all go. I played other sports, like tennis, and team sports, including rugby, in college, but I was just fascinated by football. Right after I graduated, I went to an open tryout for a women's team, the Massachusetts Mutiny. And I realized, "This is where I'm meant to be." I left my business career to do it, and the most I was ever paid was literally \$1 a game. I love everything about the game. It's full-contact chess. Most people don't realize how

smart it is. The strategy is what makes it so great. ¶ There wasn't any thought about a career path with the NFL. We'd joke that it was the No Female League. So when I got the chance to coach this past preseason with the Arizona Cardinals, it was always strange to me when people would say, "You're in the NFL now, you're living your dream." Well, no, this wasn't a dream I was ever even permitted to have. I think that part of what I'm most proud of is

that now other little girls can have that dream. ¶ When you're working with the players, you quickly realize that when you can help them, they're happy. You have to show them that you have the knowledge and the respect for the game. But you also have to connect with them as people. Before the first preseason game,

I wrote the guys notes—just reminders of things we'd worked on—and left them in their lockers. It didn't occur to me that they'd never had that happen before. I don't know that it was about being a female coach or because I have a doctorate in sports psychology, but it felt natural to me. —As told to Mark McClusky

staged. I wouldn't shake Miesha Tate's hand after I beat her the second time, but I gave Cat Zingano a hug and a kiss after we fought, because I truly empathized with her in that moment.

**On the decision to turn pro:**

My mom was the senior statistical consultant at the University of Southern California. She really wanted me to go to college. I said I wanted to do MMA. She said it was the stupidest idea she'd

ever heard and that I had to grow up. I asked her to give me one year to make the MMA thing work, and if it didn't, I'd go to college or become a rescue swimmer for the Coast Guard. And 20 days short of a year after my pro debut, I won the world title.

**On helping get women into professional mixed martial arts:**

The model that I used for women's MMA, I got from reading *The Tipping Point*, by Malcolm

Gladwell—like how to start fads and being a connector. And then I love the thing he wrote about Hush Puppies, about getting just one key cool group of people into something and then it suddenly becomes cool and takes off. In MMA I tried to appeal to a cooler inside group in the beginning.

**On playing the bad guy:**

I'd rather be a genuine and interesting bad guy than a boring fraud of a hero. I mean, the Joker is just so much more interesting than Batman. But sometimes I'm the good guy when I fight too. I'm whatever Gotham City needs me to be. —As told to Adam Rogers

Rousey (below, with her dog Mochi) is an MMA champion and action movie star.

**On authenticity:**

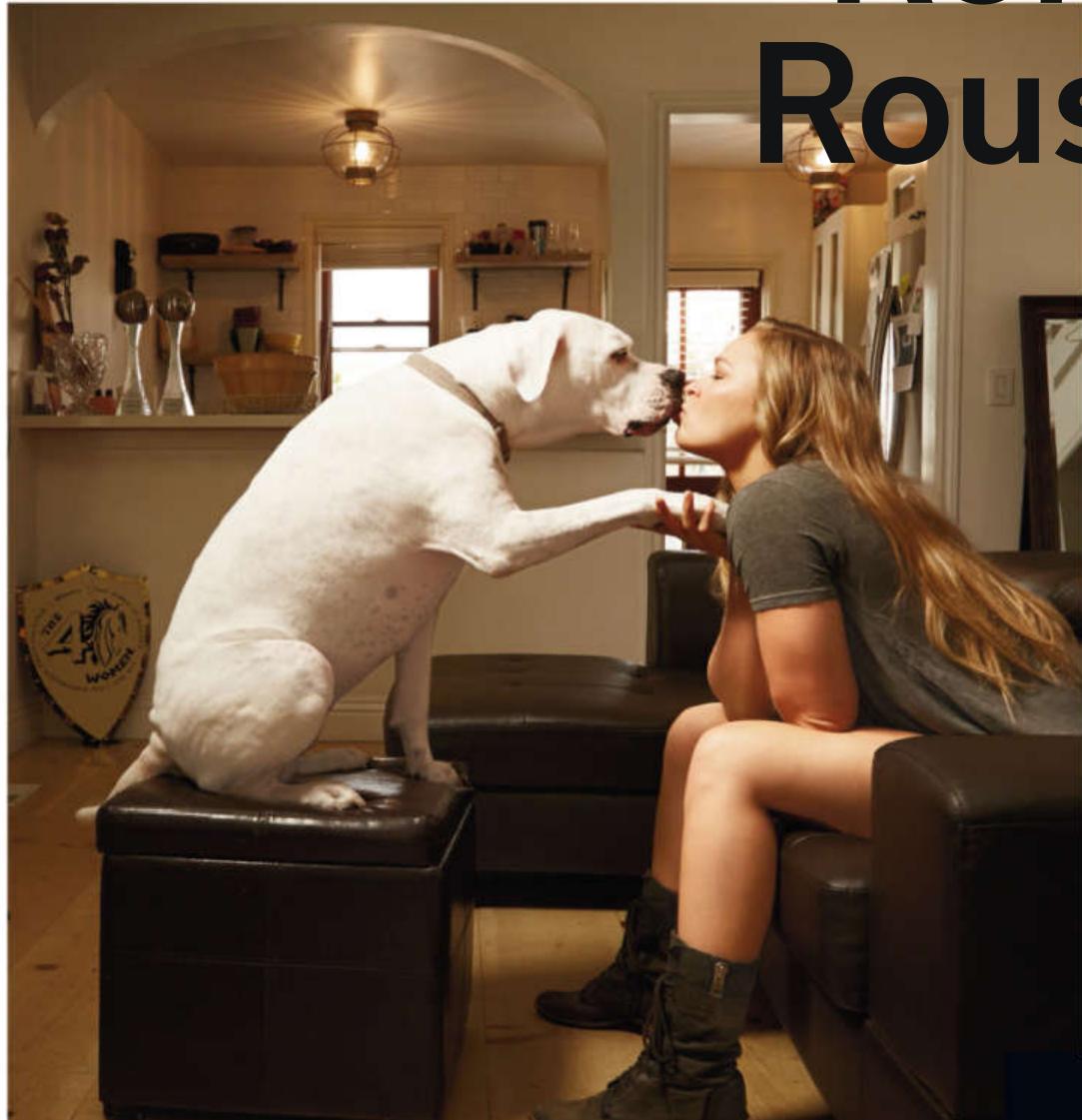
I'll let thousands of people boo me as long as I feel I was honest and authentic. That way, when I do something later that the fans like, they know it was genuine and not

# Ronda Rousey

Trailblazers

MIXED MARTIAL ARTS CHAMPION

1 0 4



HAIR BY ABRAHAM J. ESPARZA; MAKEUP BY HEE SOO KWON

Robyn Twomey

# Tristan Walker

Trailblazers

FOUNDER  
AND CEO OF  
WALKER &  
COMPANY



“  
Walker's startup sells health and beauty products designed for people of color. He is cofounder of CODE 2040, a program that places minority students in tech internships.

I grew up in the projects. My mom was very strict and wanted me to succeed. I was part of the Boys Club of New York after-school

program and was encouraged to apply to get a full ride to Hotchkiss, a prestigious boarding school. I got in, and it was the first time that I understood what wealth was. I knew I wanted to be rich. ¶ After college I started working on

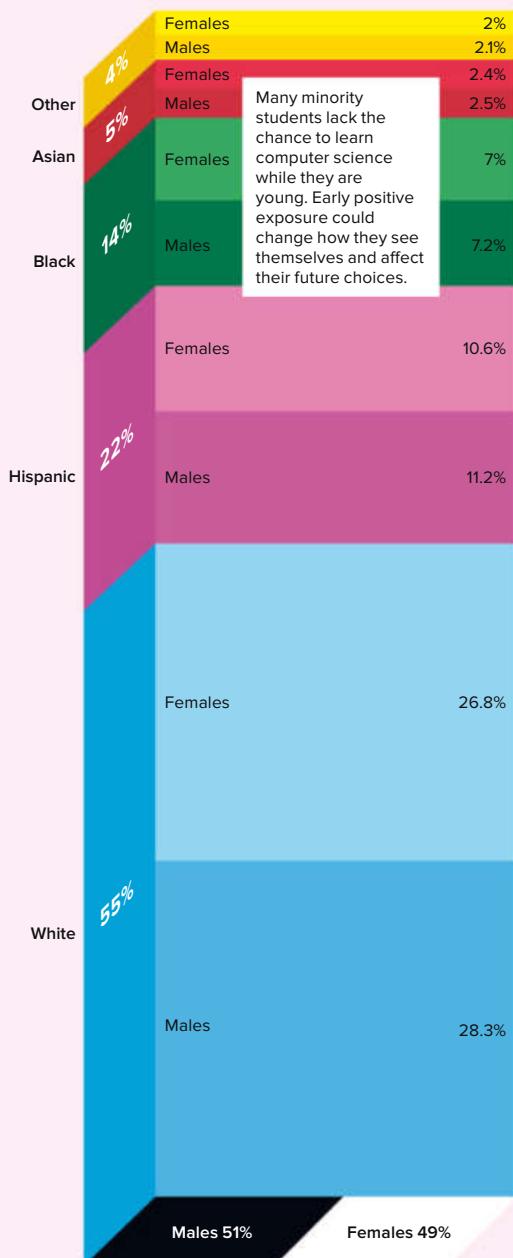
Wall Street at Lehman Brothers. One day the most senior black managing director, William Lighten, called me into his office and gave me some advice. He said, “Tristan, you want to spend the first third of your life learning, the second third earn-

ing, and the last third returning—giving back through philanthropy.” That really changed my thinking. Since I didn’t like Wall Street’s toxic culture—it was just before the meltdown in 2008—I knew I needed to do something entrepreneurial

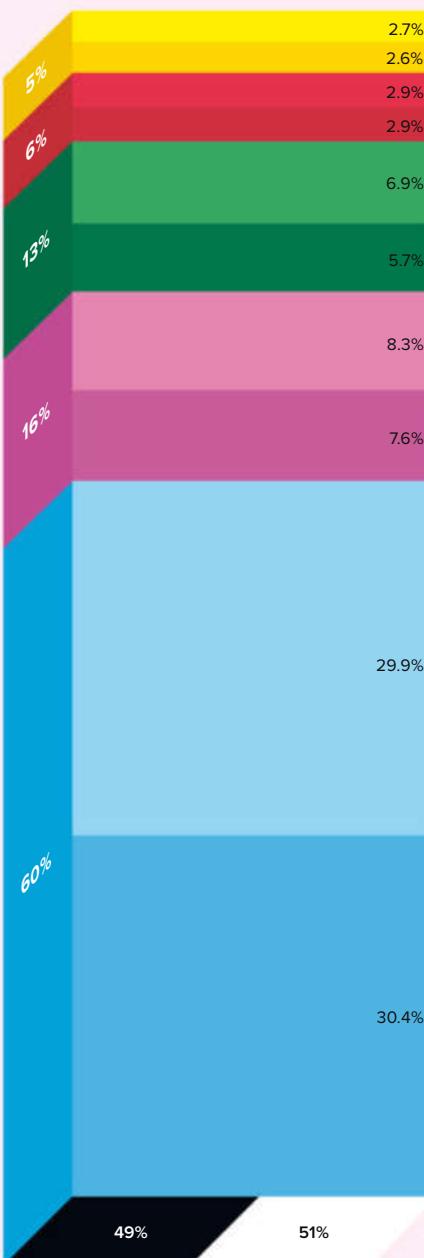
to create my wealth. So I went to Stanford Graduate School of Business and the first year also worked as a full-time intern at Twitter. Later I was the first head of business development at Foursquare. ¶ I came up with the idea for Walker & Company while I was an entrepreneur-in-residence at Andreessen Horowitz. Today we have about 20 people—the majority are minorities, the majority are women. A lot of employers say these folks don’t exist. They’re full of it. They do exist.

And they want to find great work that they can get behind. ¶ Silicon Valley really isn’t a better place to be a black tech exec than when I started in 2008. Yes, there are companies trying to mitigate bias, but there’s still work to do. That’s why I helped found CODE 2040. ¶ I wanted to work on Wall Street because I saw black leaders like Stan O’Neal at Merrill Lynch. Who are those archetypes to aspire to in tech? —As told to Jessi Hempel

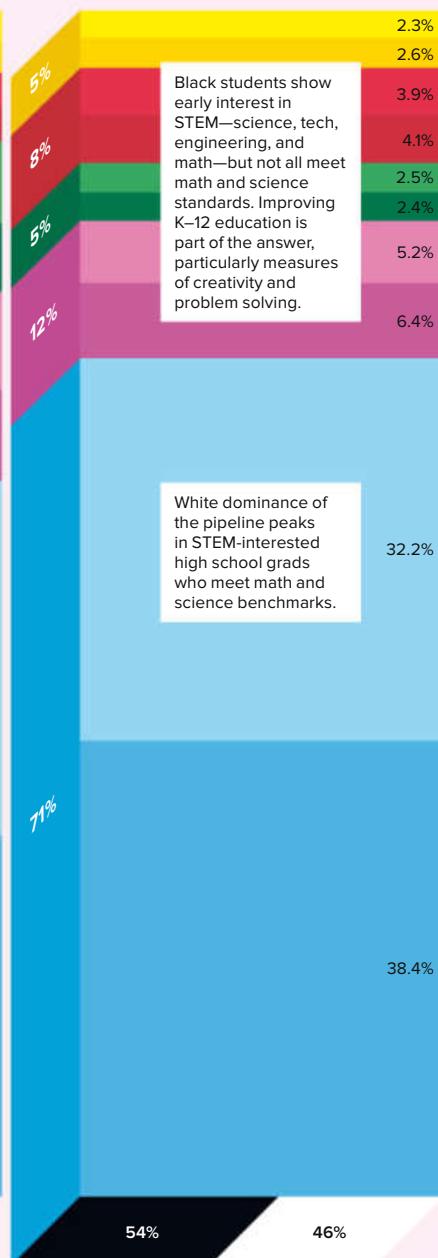
All US  
18-year-olds



High school grads  
with STEM interest



High school grads  
with STEM interest who  
meet math/science benchmarks

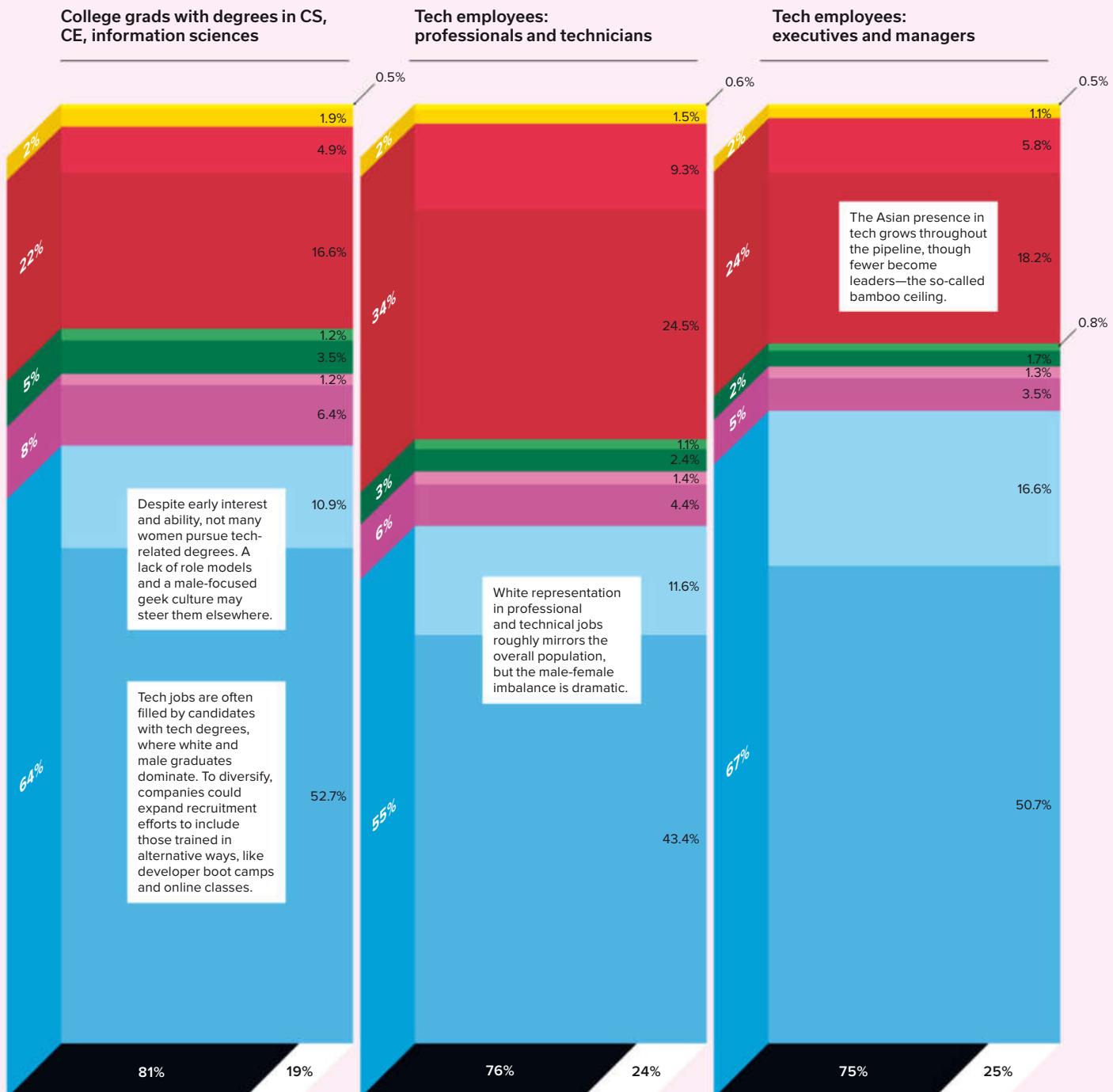


Equality  
in the  
Digital Age

1 0 6

# How Tech Stacks Up

SOURCES: U.S. CENSUS BUREAU, ACT, COMPUTING RESEARCH ASSOCIATION, AMAZON, APPLE, CISCO, FACEBOOK, GOOGLE, INTEL, LINKEDIN, MICROSOFT, TWITTER, YAHOO, YELP; PERCENTAGES MAY NOT ADD UP TO 100 DUE TO ROUNDING; FOR A FULL DESCRIPTION OF THE METHODOLOGY, SEE WIRED.COM/SOURCES



**SUPPLY IS FAR FROM THE ONLY BARRIER TO MORE DIVERSITY IN THE SILICON VALLEY WORKFORCE.**

**The statistics are** pretty one-sided: The tech industry is overwhelmingly male and predominantly white. This lack of diversity is often blamed on a poor supply of qualified candidates. Yes, Asian workers have found their way into tech in large numbers, yet female, black, and Hispanic employees remain largely absent. But if you look at the data behind the pipeline that feeds the tech workforce—the kind of work I do frequently at Three-story Studio—some of the choke points become apparent. Jane Margolis, author of *Stuck in the Shallow End: Education, Race, and Computing*, prescribes more computer science education in the schools and giving kids exposure to tech role models. That's a start. But we'll need to work on the far end of the pipeline too—challenging the ingrained patterns and assumptions within companies that lead to biased hiring and promotion practices—if we hope to change perceptions of who belongs in the tech workforce. —ERIK JACOBSEN

#### Race/Ethnicity

- Other
- Asian
- Black
- Hispanic
- White

# Take Back the



For people who aren't white men, the Internet can be a threatening place. We asked six experts what Silicon

01.

**Nadia Kayyali**  
is part of the Electronic Frontier Foundation's activism team, whose focus includes racial justice and digital civil liberties.

02.

**Chinyere Tutashinda**  
is a member of Black Lives Matter Bay Area and a founder of BlackOUT Collective.

03.

**Adria Richards**  
is a DevOps engineer who promotes technical solutions for reducing online harassment. Her dog's name is Mr. Bojangles.



Valley should do about it. **I O S**

04.

**Laura Hudson** is a former editor at, and current contributor to, WIRED. She moderated the roundtable conversation.

05.

**Anil Dash** has been involved in building social platforms for more than a decade. He blogs about the way technology shapes society.

06.

**Del Harvey** is vice president of trust and safety at Twitter. She helps develop and apply policies that govern user behavior on the social network.

07.

**Anita Sarkeesian** (not pictured) is the founder of Feminist Frequency, a site that explores how women are represented in pop culture.

Silicon Valley is all about using tech to come up with solutions to gnarly problems. Yet the ugly reality of online harassment has remained intractable. The Internet, which has so amplified the voices of women, minorities, and LGBT folk, is still very much a free-fire zone for those who would shame, silence, or abuse them. A 2014 study by the Pew Research Center found that 25 percent of 18- to 24-year-old women have been the target of online sexual harassment. Last year the issue erupted in the mainstream media with Gamergate. The online movement targeted a female game developer, making accusations about her sexual life and publishing her address and phone number, prompting her to move out of her home. In September, WIRED convened a roundtable of people deeply involved in the issue to discuss what it would take to produce lasting change.

context. To make a judgment, you need information that technology is very bad at capturing.

**Anita Sarkeesian**

We need to broaden the definition of online harassment and abuse. For example, someone will post a YouTube video that defames me, and then thousands of people will reply to that video and tweet at me "You liar" or "You dumb bitch." That's not a threat, but it's still thousands of people coming after me, right?

**Adria Richards**

There's one thing about harassment that's clear when you monitor traffic: It's consistent in frequency. So if you take a period of time and then look at the number of incidents or interactions within that, it's really clear that someone's being attacked by a lot of people. Companies should develop algorithms and automated processes for detecting, evaluating, and responding to that. I always point out that Google is very concerned about click fraud, and they have processes to identify click fraud.

**Dash**

It's a business problem to them.

**Richards**

I'd like online harassment and abuse to become a business issue too, because people are starting to compare social networks to cities that aren't

**"We can't change everybody's minds. But we can make it so they can't come after people as easily."**

—Anita Sarkeesian



safe to walk anymore. Let's incorporate antiharassment features when we're building our platforms, to deter that behavior.

**Dash**

For 15 years I've had the same conversation over and over, about how we can be much more mindful of the effects of the way systems are designed. You get a new app, it's made by kids who are 22 years old, and they weren't around 10 years ago when the same cycle happened before. There's no body of knowledge they're learning from. There's no ethics curriculum in most computer science programs in this country.

**Harvey**

People often start with the best intentions, and then all of a sudden things get a lot bigger. How do you take your policies and philosophies and make them scale? That's one of the biggest challenges that we're still very much working on.

**Richards**

There are communities that are doing it just fine. On

*This conversation has been edited for clarity and space constraints.*

**WIRED**

Defining harassment can be really complicated. Del, you've said before that's a challenge for you and Twitter.

**Del Harvey**

At 140 characters, there's a lot of context that you don't necessarily have when you look at a tweet. Understanding what someone really meant can be challenging. You can see an account saying, "Hey, bitch," to another account, and that could be a friend saying hello to another friend or it could

be someone being abusive. And the third example, which I have in fact seen, is someone who's role-playing as a dog. [Laughter.] So we look at the ways that people interact more than at the content or the words themselves.

**Anil Dash**

A lot of people have this knee-jerk desire to simplify the problem and think that harassment is if you do *x, y, or z*. That just ignores the

**"Ten years ago when people behaved abusively, I was the guy saying, 'We believe in free speech, and people are going to be jerks, and it's not our fault.' I didn't get it."**

—Anil Dash



Metafilter, for example, people have totally elevated, helpful conversations, and there's no name-calling.

#### Dash

There's a site for programmers, Stack Overflow, and full disclosure, I'm on the board. People on Stack Overflow have religious wars about programming languages, whatever. But the site supports anonymity and pseudonymity. And there isn't a lot of gendered abuse. You go to YouTube videos about the exact same topics and people are being horrible. You make a set of choices early on about how you build the social dynamics, and you set expectations about what's not going to be tolerated. Stack Overflow has really good tools. Moderators are people from the communities relevant to the discussions and are elected into authority roles. There's a high ratio of moderators to users, and rules are strictly enforced. And it's a big site. Its network, Stack Exchange, is within the top 50 most visited sites in the US on Quantcast.

#### WIRED

What responsibility do platforms have to their users in terms of protecting them from abuse?

#### Richards

After a threat, I reached out to someone at a social media company. They connected me to one of their security people. I emailed them, saying, "I'm very concerned I'm going to be murdered in the next two weeks." They asked me to file a ticket, so I did. I didn't hear back. So I got another name to contact and sent a similar email to someone else. They also asked me to file a ticket. Thankfully I'm still here, so I wasn't murdered. Yay.

#### Dash

Ten years ago when I was building social tools, when people behaved abusively, I was the guy saying, "We believe in free speech, and people are going to be jerks, and it's not our fault." I didn't get it. And that understanding took me 10 years. I mean, I've been doxed by people using the tools that I built.

#### WIRED

Doxed, meaning someone maliciously published private information about you on the Internet. You raise an interesting point—that tools built for a good purpose can be misused.

#### Harvey

That is something Twitter puts a ton of time and effort into. When we first made it possible to upload photos, we decided to strip out metadata, because a ton of these images are taken via your smartphone or your digital camera. And guess what, your exact location is often in the metadata. I didn't want us to potentially put people in danger. I refer to the work that my department does as "catastrophization": What is the worst thing that could go wrong? Let's work backward from that, to see what protections we can put in place to try to minimize it. Honestly, if people are doing startups

#### Kayyali

Advocates who represent the groups that Facebook is supposedly protecting with the real-names policy have repeatedly said that, no, real names are not the most important thing when it comes to protecting vulnerable groups like trans people and domestic violence sur-



#### Chinyere Tutashinda

I work within the social justice movement, and there's no one, especially in the black community, who doesn't expect harassment online. It's just replicating what happens in the real world, right? How do we make other people know and care?

#### Richards

I have been on Twitter since 2008. I was never called the N-word until the mob went after me in 2013.

#### Tutashinda

That's where security plays a big role. At BlackOUT Collective, we helped coordinate a series of actions this winter. Afterward we got severely trolled, like for hours and hours and days and days. At one point an ex-police officer used our action's hashtag to tweet a picture of himself pointing a gun at the camera with a caption that said, "Move along." That line between what's real and what isn't—how far you are willing to take this—becomes really scary. The level of racism and visceral hate is astonishing.

#### Sarkeesian

The thing is that oppression didn't start with the Internet. Racism and sexism and transphobia and homophobia have been around for a long time. The activist movements before us created real structural changes that forced our communities to change, so that it wasn't acceptable to say racist slurs in front of other people. The civil rights movement didn't persuade every white person to stop being racist, it forced people to behave differently. We can't change everybody's minds individually. But we can make it so that they can't come after people as easily.

#### WIRED

What is the biggest stumbling block? Is it getting companies and platforms to recognize the severity of the problem, or is it getting them invested in the solutions?

#### Dash

It depends on the company. I think Twitter broadly gets it. I think the first step is literacy. The people who are in power are not the people who

**"There's no one, especially in the black community, who doesn't expect harassment online. It's just replicating what happens in the real world. How do we make others care?" —Chinyere Tutashinda**



or trying to get something off the ground, please don't hesitate to reach out. I'm happy to talk to you about what I've learned, and what you should and shouldn't do, and what will hurt a lot when it goes horribly wrong.

#### Nadia Kayyali

I think a perfect example is Facebook's real names.

#### WIRED

You're referring to their policy of requiring users to register the name they are known by.

vivors from harassment and violence. In fact, for some people—like people trying to avoid a stalker—it's not being allowed to use a pseudonym that's the problem.

#### Sarkeesian

We need to protect and value pseudonymity and anonymity under certain circumstances.

#### WIRED

Online harassment disproportionately affects women, people of color, and LGBT people. Can we talk about that?

are marginalized enough to get attacked, and they tend to think, why don't you ignore them? They can't understand this is an organized campaign trying to go after my income, my line of work, my family, to put me in danger. There's a playbook: Here's how you take somebody's life apart.

#### Harvey

There's still a strong narrative that "online is not real life."

#### Kayyali

There's still the idea, for a lot of people, that the Internet is this special place where we go and suddenly we're not people of color, we're not trans. But we're now seeing that it's a place where the differences matter. Free speech as an excuse for bad behavior has been conflated with the idea that free expression is an important value.

#### WIRED

Nadia, you're someone who has been harassed and doxed and yet who believes very strongly in free expression. Those two things are so often in conflict. How do you reconcile them?

#### Kayyali

In terms of the actual structure of the Internet, these are things that EFF is yelling about all the time. Sometimes it feels like we're off in a corner saying, "Hey, your domain registration requires people to put in their address. That doesn't make any sense. All of this information



gets sold to data brokers. That's such a good way for people to get doxed." We were really excited to see Twitter creating block lists. There may be less agreement on the fine points of deciding what speech is and isn't OK. But I think that's much smaller than the areas that we do agree on.

#### WIRED

Most of our conversations about online harassment tend to focus on people in the United States. What are we missing in terms of a broader global perspective on online harassment?

#### Kayyali

At Facebook, they have the platform in regional languages, but they have very limited regional language support—people who speak it—to deal with complaints.

#### WIRED

This allows authoritarian governments to hire troll armies

**"Harassment at a global level is often political. It's the Free Syrian Army versus Assad's paid Internet commenters."**

—Nadia Kayyali

number, there were other options. Because outside the US, if the telecom is directly connected with the government, a phone number can lead the authorities to someone who's an activist or a dissident or a whistle-blower.

#### WIRED

Are there any other steps companies could take to discourage online harassment?

#### Harvey

It's a challenge because the same sort of tool that you develop to help people can potentially be repurposed to target people. Sometimes we hear suggestions like, just give users a way to see what accounts are involved and identify the ones that are the primary drivers and that have the most clout, so they can be reported. And I'm like, yes, but what if someone took that same tool and used it against a marginalized group to identify who to target in order to harm that group the most?

#### Richards

Just like there are bounties for finding security flaws, there could be bounties for effective antiabuse tools. There needs to be a value on this work.

#### Dash

Almost nobody starts coding this stuff without ever having been harassed, right?

#### Richards

There could be little pop-up warnings: "Hey, a lot of people have reported they don't like receiving this word. Do you still want to post this?"

#### Kayyali

Can we shame people with pop-ups? Because shame seems to work a lot better. "Hey, did you know you're being racist right now?" [Laughter.]

#### Richards

Education could work too; maybe provide a little link.

#### Harvey

The majority of our users are on mobile, which means that we have very limited screen space.

#### Richards

I've come up with various app ideas—for example, helping

**"Twitter recently introduced a couple of different identification paths for accounts. We wanted to make sure that we weren't unduly putting people at risk."** —Del Harvey



someone who is nontechnical to document harassment.

#### **Kayali**

There should really be one site that you can go to, just like the Do Not Call Registry, and you can fill it out. That seems like a fantasy now for anyone who's gone through the Crash Override Network, the guide to protecting yourself from doxing.

#### **Tutashinda**

There is a lack of diversity in who's creating platforms and tools. Too often it's not about people, it's about how to take this tool and make the most money off it. As long as people are using it, it doesn't matter how they're using it. There's still profit to earn from it. So until those cultures really shift in the companies themselves, it's really difficult to be able to have structures that are combating harassment.

#### **WIRED**

Do we need better laws?

#### **Dash**

If you talk to members of Congress, they're like, "Yes, online abuse is bad."

#### **Kayali**

They have a very dangerous knee-jerk reaction.

#### **Sarkeesian**

When I think about solutions, I think about it in a three-pronged approach: a cultural shift, tech solutions, and then the legal aspect. There are already laws against this stuff. Sending someone a death threat is already illegal, so having it taken seriously is the third prong.

#### **Tutashinda**

In terms of Black Lives Matter and the broader movement, I know that the police, the FBI—they're actively watching us on social media. So they see the threats. They see the level of harassment and are not doing anything.

#### **Kayali**

There is some work to be done by groups like mine with law enforcement, so that they actually understand these technologies. What we're seeing is an analogue of rape culture and a racist criminal justice system. So things that happen to women,

things that happen to people of color, are not taken seriously. Until we address those bigger issues, it's really hard to have a legal response.

#### **Dash**

The leaders of the abuse communities are very legalistic. They read every detail of exactly how far they can go and exactly how they can

ter today?" As opposed to, "Hey, that's not OK, we need to flag this person." Or on YouTube, people don't reply to the level of hate or body shaming or harassment that they see. We just kind of let it go and expect the platform or the person being harassed to do all the work. We have to create a society that says it's not OK to do it.

#### **Richards**

The most significant changes would come from the tech companies that run these platforms. If they were to increase diversity on their advisory boards and their safety teams, that would help inject more ideas.

#### **Tutashinda**

Diversity plays a huge role in shifting the culture of organizations and companies. Outside of that, being able to broaden the story helps. There has been a lot of media on cyberbullying, for example, and how horrible it is for young people. And now there are whole curricula in elementary and high schools. There's been a huge campaign around it, and the culture is shifting. The same needs to happen when it comes to harassment. Not just about young people but about the ways in which people of color are treated.

#### **Dash**

Digital direct action works, in terms of holding the social networks accountable. The people who run them, they hear it, they pay attention to it, they're embarrassed by it. If you care about free speech, then you have to protect people from being silenced by abuse. ▀

**"If the tech companies that run these platforms were to increase diversity on their advisory boards and safety teams, that would help inject more ideas."** —Adria Richards

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phrase this and how they can structure it so it's technically legal. The things that are impacting the most people are technically allowed. That's where the industry and activists can come together and have a lot more impact.

#### **Tutashinda**

It requires a cultural shift. We've been able to shift culture so that people don't say those things out loud. We have to do the same thing online. I have friends who have gotten horribly harassed on Twitter, and the only people who say anything or respond are individuals they know. It's not the rest of the users who are following the conversation and saying, "Oh my God, have you seen what happened on Twit-



# Common & Mahalia Hines

Common is a Grammy- and Oscar-winning hip hop artist and activist.

My mother has been a true example of the diligence, commitment, and passion it takes to drive kids to excellence. That will be her legacy—bringing that to Chicago. ¶ At home, education was something that was celebrated, something that was valuable. All of my friends knew that if I didn't do well, then I wouldn't be able to hang out. She had me in a computer class at the Museum of Science and Industry, and I would have to read books that she gave me to read—all in addition to school. Whether you know it or not at the time, all of that is feeding you: It's giving you not only a foundation of education but also discipline. We established the Common Ground Foundation in 1998 to help better equip kids when there's no support system. I was inspired by seeing what she's done as an educator, going beyond just teaching kids to truly caring

for the community. I had a great support system and family at home, and I always felt like I saw people who didn't have that, and I wanted them to have it. That was the seed.

Dr. Hines is Common's mother and a member of the Chicago Board of Education.

Mine was the first generation in my family to go to college, and education was always first and foremost in my life. Common always did extremely well, but I also treated my students as my own. I had the same expectations for them that I had for my own. I gave the best of me and expected the very best of them back. ¶ I taught for 12 years in Chicago public schools, and I was a principal for 17, mostly at John Hope in Englewood. It's

always been a tough neighborhood. Many of the opportunities that are afforded to different parts of Chicago are not afforded to those kids. I felt that if the children at John Hope were given the same opportunity that other children were given—and if they knew that you loved them—then they would thrive. ¶ Things are getting better. I'm excited that we have people who went to our schools now running our schools. In addition, math and science are big priorities—we have the most comprehensive K–12 computer science program of any major school district in the nation. To bridge the divide between the haves and have-nots, we need technology.

—As told to Peter Rubin

## Trailblazers

### A HIP HOP ARTIST AND HIS MOTHER, AN EDUCATOR



my older brother did. He was a techie, so I made myself get involved with tech too. And he hated it. He just didn't welcome me following him around, trying to play videogames with him and his friends. ¶ But I stuck with it, and by high school my guidance counselors said engineering might be a good career for me. They both were black women who really helped me to set high expectations for myself. Having those mentors was absolutely key for me. I don't know that I could have done it without them. ¶ So seeing my daughter's camp was a wake-up call. I didn't want her to lose this interest in tech just because the only other kids who were interested in it were boys who weren't inviting her to the circle. That led me on the path to creating Black Girls Code. ¶ We really didn't plan on growing as big as we are. Initially, I just wanted to take money out of my savings and send a group of girls to the same summer camp, so my daughter wouldn't be alone. But now we're in nine cities,

and each of those chapters reaches between 200 and 500 students a year. That's a lot of little black and brown girls learning to code, and I just know that many of our students are going to go on to become leaders in technology. I have absolutely no doubt.

—As told to  
Issie Lapowsky

*Bryant's Black Girls Code organization has taught computer science skills to more than 4,000 girls in nine cities around the world.*

My daughter was never into combing dolls' hair and playing with Barbies. She was into Legos and building things and playing with her Game Boy. By the time she was in middle school, she was old enough to go to an overnight summer coding camp. It was life-changing for her. She loved it. But the thing I noticed at the camp was that there were very few girls in the classroom. And there was one student of color. That was her. ¶ It really resonated with me because, growing up, I was a tagalong little sister who always wanted to prove that even though I was a girl, I could do things

# Kimberly Bryant



Trailblazers  
FOUNDER OF  
BLACK  
GIRLS CODE



# Nice WORk

Why the gig economy is good for women.

by Anne-Marie Slaughter

If you're an American worker, chances are your job either doesn't grant you much flexibility or else requires far too much of it.

If you're lucky enough to have a traditional 9-to-5 gig, you're also probably unlucky enough to be held to the standard of what gender and labor scholars call the "ideal worker": a hypothetical employee who shows up early, makes every meeting, never gets sick, says yes to every new project, is constantly available on mobile devices, and can jet off on a work trip at a moment's notice. The cult of the ideal worker has been with us for decades, but it receives frequent updates. Consider the *New York Times'* recent portrait of Amazon's work culture, in which employees continually challenge themselves and each other to work harder, longer, and smarter in a spirit of "purposeful Darwinism."

At the other end of the employment spectrum, meanwhile, minimum-wage workers suffer not from too little flexibility but too much. A growing swath of the American workforce now labors at the whim of something called just-in-time

scheduling. Their employers use software to assign shifts for armies of part-timers, with algorithms that make adjustments in real time. Workers may be called up for duty with just a couple of hours' notice or show up only to be sent home.

In either kind of workplace, many of the employees who get driven out of their jobs by these demands are caregivers of one kind or another. These positions are simply incompatible with the very different and all-too-human rhythms of children, the sick, or the elderly—the rhythms of human bodies, of school activities and sports games, of birthdays, anniversaries, weddings, and funerals. And women are still overwhelmingly our primary caregivers, even as a majority of them are also bringing home income.

People who are responsible for caring for loved ones need the ability to fit their work and caregiving schedules together. That's where the new digital labor economy—call it what you like: the gig economy, the on-demand economy—holds enormous promise, if we make the right choices.

For professional women, the on-demand economy is already a godsend. Lawyers, business executives, bankers, doctors, and many others can continue to advance in their careers or at least stay in the game while being the kind of parents they want to be. Consider Axiom Law and Bliss Lawyers, two legal services that rent out a bench of high-quality law firm alumni to large companies on a project basis—doing the same work that law firms do but at a fraction of the cost and a multiple of the flexibility. But on-demand work at the low end of the income scale poses a bunch of problems. On the plus side, workers can stay home when a child is sick or school is closed and not lose their jobs. They can also at least try to work as many hours as they need. That puts on-demand work ahead of many part-time, low-wage jobs. But what these workers usually cannot do is make a real living, much less support the arc of a life that builds assets in middle age to support a comfortable retirement.

For the on-demand economy to work for everyone, it must be accompanied by what some policy wonks call a portable social safety net—a benefits package, essentially, that travels with a worker from gig to gig. We also need a way to give on-demand workers more bargaining power vis-à-vis the Ubers and TaskRabbits of the world, which is perhaps an even trickier puzzle. (For more specifics, see the expanded version of this story at WIRED.com.) These challenges are worth tackling precisely because of the potential here. Your children are young, and your parents are old, only once. And the traditional image of a career as a ladder, a race, or a scramble to the top that cannot be interrupted is an idea worth overthrowing. On-demand work can also mean on-demand time for caregiving, for women and for men. The technology has changed enough to make it happen. It's the human factors—the hide-bound attitudes and dysfunctional policies—that are holding us back. ■



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Sara Andreasson

# again

by Jessi Hempel



**Ask Siri if she's a woman.** Go ahead, try it. She'll tell you she's genderless. "Like cacti. And certain species of fish," she might say. So is Amazon's Alexa. Microsoft's Cortana. Samsung's S Voice. And Google Now. But man, do they ever sound a lot like women.

Culturally, we think of them as ladies too. (In Old Norse, Siri translates to "a beautiful woman who leads you to victory.") We assign female pronouns to them, and in turn, they fold feminine turns

of phrase into their robotic and occasionally inane answers to our requests.

The world is about to start sounding even more feminine, as voice systems pop up in things that are not phones and prove to be a more effective interface than keyboards. Siri is an integral element to navigating the newly announced Apple TV. The Nest smoke detector interacts with users via a female voice. We prize gender diversity in plenty of other areas; why does most of our tech sound so female?

It would be easy to credit—or fault—male designers, perhaps influenced by science fiction characters (in *Her*, for example, or *Ex Machina*) or, worse, defaulting to the stereotype of a compliant sidekick. But the biggest reason for the female slant rests in social science and its impact on business. By and large, people tend to respond more positively to women's voices. And the brand managers and product designers tasked with developing voices for their companies are trying to reach the largest number of customers.

"The research indicates there's likely to be greater acceptance of female speech," says Karl MacDorman, an associate professor at Indiana University's School of Informatics and Computing who specializes in human-computer interaction.

MacDorman should know. He and fellow researchers played clips of male and female voices to people of both genders, then asked them to identify which they preferred. The researchers also measured the way participants actually responded to the voices. In a 2011 paper, they reported that both women and men said female voices came across as warmer. In practice, women even showed a *subconscious* preference for responding to females; men remained subconsciously neutral. "Men will say they prefer female speech, and women really do prefer it," MacDorman says.

This inclination suggests that companies will make a better impression on a broader group of customers with a woman's voice. But not just any voice. It has to align with a brand's personality. For help, they often turn to Greg Pal, vice president of marketing, strategy, and business development at Nuance Communications, which licenses its library of more than 100

voices. We recently met up in New York, just outside the 20th annual SpeechTEK conference, where he assured me that sometimes those brands actually choose male voices. He turned on his iPhone and pulled up the Domino's Pizza app, which has an assistant, Dom. He sounded like my high school English teacher—educated and helpful but not overbearing. Says Pal, "It's professional, in that you can have confidence the order will go through, but at the same time it can be warm and playful." That's about right for a brand attempting to appeal to a group of adolescent guys ordering pies before the big game on a Sunday afternoon. And it explains a lot about how these decisions get made. Pal says, though, that most brands opt for a female track.

A good voice user interface is one that doesn't draw attention to itself. Pal explains that if the voice itself is distracting, your brain is going to have a harder time concentrating on the actual message. If you've grown up speaking American English, for example, a British accent could throw you off. "The more you have people focused on the information they're getting and have the voice fade into the background, the better," he says.

In the short term, female voices will likely remain more commonplace, because of both cultural bias and the role technology plays in our lives. The late Stanford communications professor Clifford Nass, who coauthored the field's seminal book, *Wired for Speech*, wrote that people tend to perceive female voices as helping us solve our problems by ourselves, while they view male voices as authority figures who tell us the answers to our problems. We want our technology to help us, but we want to be the bosses of it, so we are more likely to opt for a female interface.

To complicate matters further, adjusting the gender of an interface is not as simple as switching the voice track. Nass explained that men and women tend to use different words. For example, women's speech includes more personal pronouns (I, you, she), while men's uses more quantifiers (one, two, some more). If someone listening to a voice interface hears a male using feminine phrasing, they are likely to be distracted and distrustful. Companies



**When computers talk to us, their voices are almost always female. There's actually some science behind that—and potentially change ahead.**

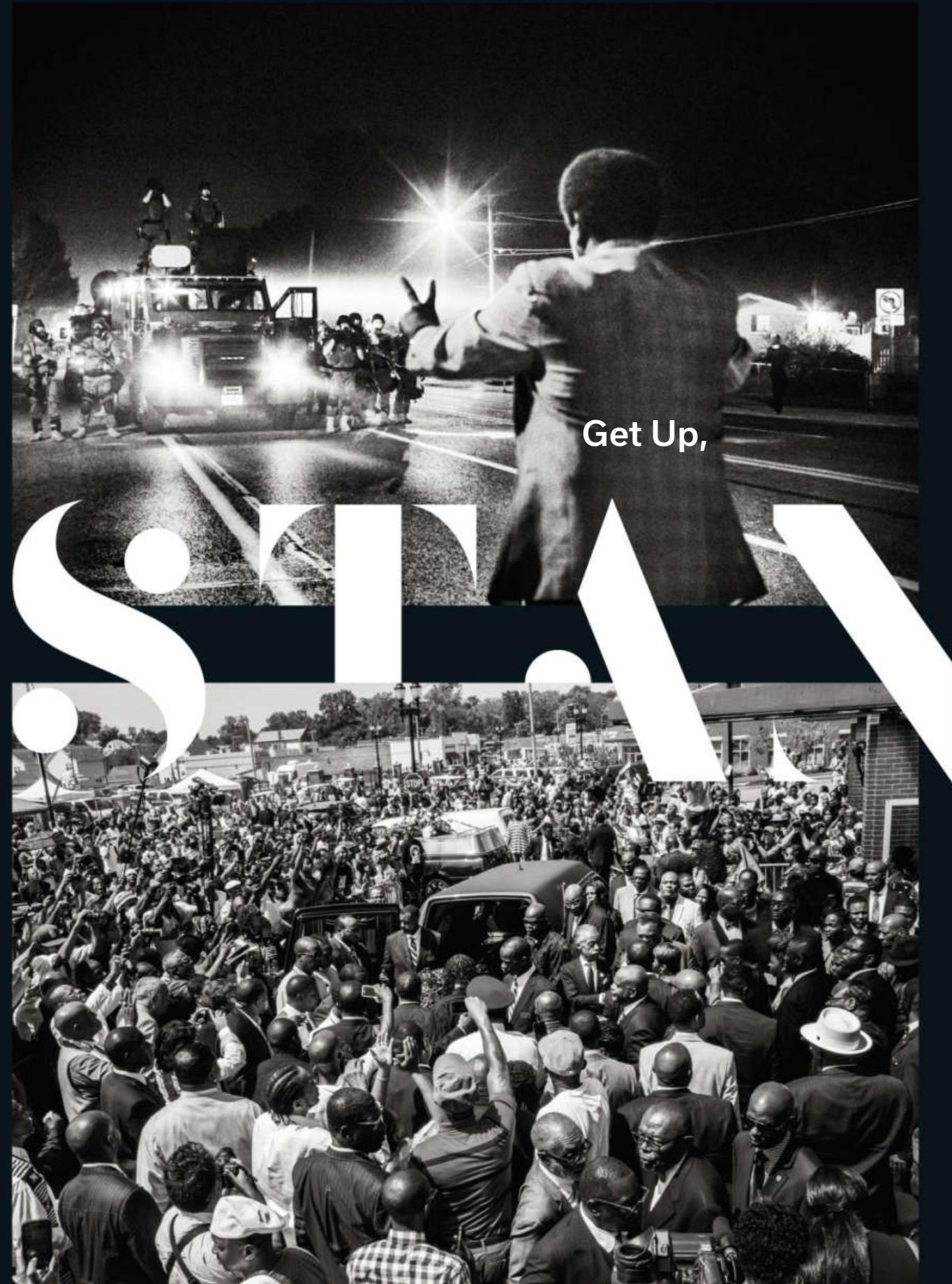
1 1 5

preparing scripts for computer voices will have to take factors like this into account.

As voice technology improves, though, designers say diversity will too. Thanks to big data, cloud computing, and the artificial intelligence those trends enable, companies will be able to tailor voices specifically to individuals, making sure you hear the ones that most resonate with you. Already, many devices offer the ability to customize a voice interface. Thus Homer Simpson can tell you where to take a left

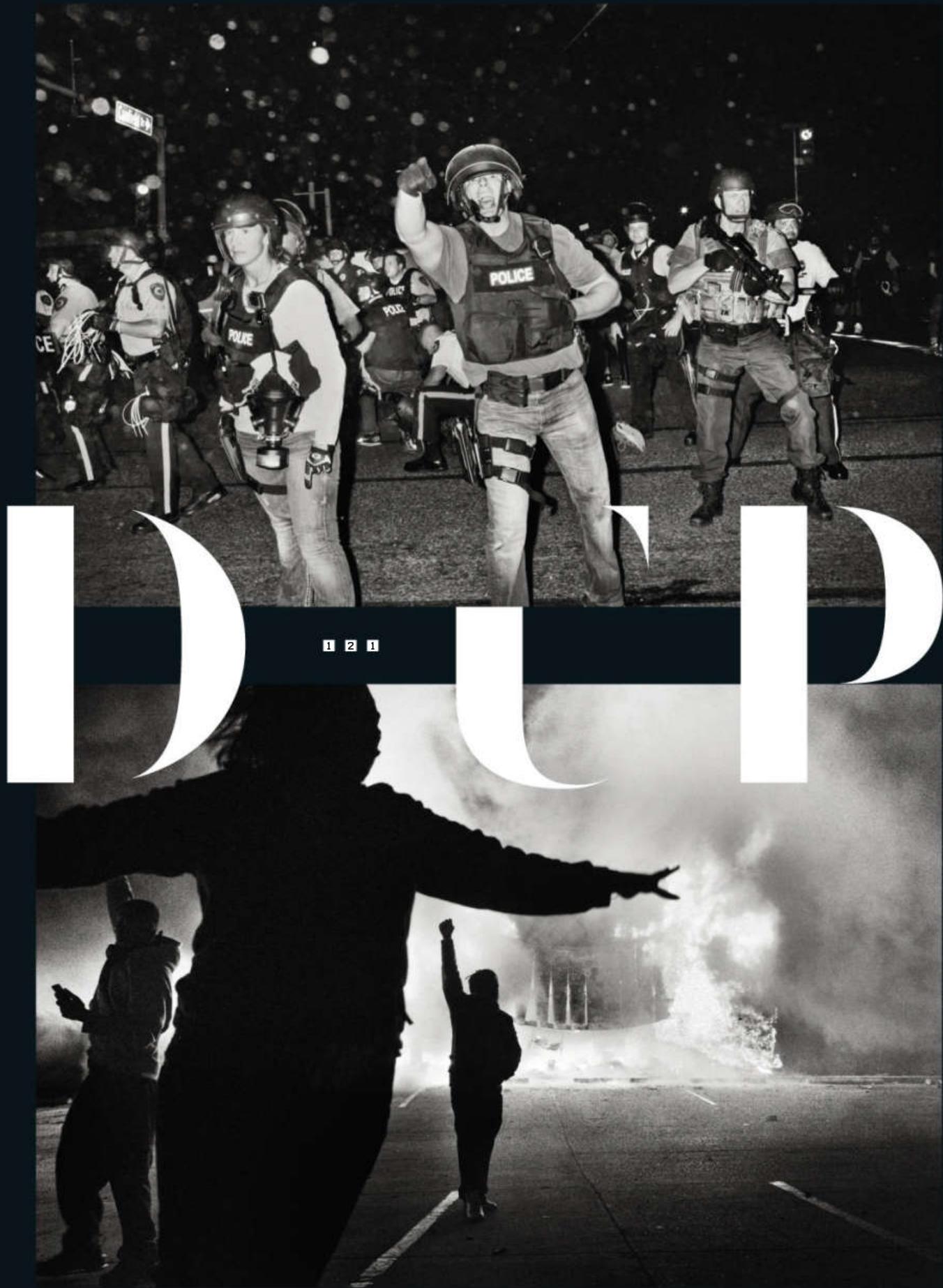
on your GPS device. And Siri can become a guy, if you take the time to scroll through your settings to reprogram it. Ideo executive design director Danny Stillion says this trend is likely to continue. "For different services, you might interact with different voices on the same device," he says. We can only hope that as future AIs are better able to understand a user's preferences, the technologies they give voice to will begin to reflect the diversity of the world around us. ▀

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How Black Lives Matter is rebooting the civil rights movement for the 21st century. by Bijan Stephen

Scenes from Ferguson, Missouri, in 2014, after the unarmed Michael Brown was shot by police officer Darren Wilson.



1 2 1

**In the 1960s**, if you were a civil rights worker stationed in the Deep South and you needed to get some urgent news out to the rest of the world—word of a beating or an activist’s arrest or some brewing state of danger—you would likely head straight for a telephone.

From an office or a phone booth in hostile territory, you would place a call to one of the major national civil rights organizations. But you wouldn’t do it by dialing a standard long-distance number. That would involve speaking first to a switchboard operator—who was bound to be white and who might block your call. Instead you’d dial the number for something called a Wide Area Telephone Service, or WATS, line.

Like an 800 line, you could dial a WATS number from anywhere in the region and the call would patch directly through to the business or organization that paid for the line—in this case, say, the Student Nonviolent Coordinating Committee.

On the other end of the line, another civil rights worker would be ready to take down your report and all the others pouring in from phones scattered across the South. The terse, action-packed write-ups would then be compiled into mimeographed “WATS reports” mailed out to organization leaders, the media, the Justice Department, lawyers, and other friends of the movement across the country.

In other words, it took a lot of infrastructure to live-tweet what was going on in the streets of the Jim Crow South.

Any large social movement is shaped by the technology available to it and tailors its goals, tactics, and rhetoric to the media of its time. On the afternoon of Sunday, March 7, 1965, when voting-rights marchers in Selma, Alabama, were run down by policemen at the Edmund Pettus Bridge, the WATS lines were in heavy use. (“Here come the white hoodlums,” an activist said from a corner pay phone at 3:25 pm.) But the technology that was most important to the movement’s larger aims was not in activists’ hands at all: It was in a set of film canisters being ferried past police blockades on Highway 80 by an ABC News TV crew, racing for the Montgomery airport and heading to New York for an evening broadcast. That night, 48 million Americans would watch the scene in their living rooms, and a few days later Martin Luther King Jr. would lay bare the movement’s core media strategy. “We will no longer let them use their clubs on us in the dark corners,” he said. “We’re going to make them do it in the glaring light of television.”

“It was a rare admission,” writes media historian Aniko Bodroghkozy. “King and other civil rights organizers seldom acknowledged their own self-conscious use of the mass media.” Today’s African-American civil rights organizers, by contrast, talk about the

tools of mass communication all the time—because their media strategy sessions are largely open to everyone on the Internet.

If you’re a civil rights activist in 2015 and you need to get some news out, your first move is to choose a platform. If you want to post a video of a protest or a violent arrest, you put it up on Vine, Instagram, or Periscope. If you want to avoid trolls or snooping authorities and you need to coordinate some kind of action, you might chat privately with other activists on GroupMe. If you want to rapidly mobilize a bunch of people you know and you don’t want the whole world clued in, you use SMS or WhatsApp. If you want to mobilize a ton of people you might not know and you do want the whole world to talk about it: Twitter.

And if, God forbid, you find yourself standing in front of the next Michael Brown or Walter Scott, and you know the nation’s attention needs to swerve hard to your town, your best bet might be to send a direct message to someone like DeRay Mckesson, one of a handful of activists who sit at the apex of social networks that now run hundreds of thousands strong. “The thing about King or Ella Baker is that they could not just wake up and sit at the breakfast table and talk to a million people,” says Mckesson, a former school district administrator who has become one of the most visible faces of the movement. “The tools that we have to organize and to resist are fundamentally different than anything that’s existed before in black struggle.”

## B

#BlackLivesMatter became a hashtag in the summer of 2013, when an Oakland, California, labor organizer named Alicia Garza responded on her Facebook page to the acquittal of George Zimmerman, the man who gunned down Trayvon Martin. Since then it has become the banner under which dozens of disparate organizations, new and old, and millions of individuals, loosely and tightly related, press for change.

Any phenomenon that seizes the nation’s attention this much needs a name—headline writers make sure of that. But it is hard to talk about the national Black Lives Matter movement without imparting a false sense of institutional coherence to it. Of course, the civil rights movement of the ’60s was itself far from monolithic, but there aren’t really analogues to the Southern Christian Leadership Conference or the Student Nonviolent Coordinating Committee in today’s activist scene. “It’s decentralized but coordinated,” says Maurice Mitchell, an organizer with a group called Blackbird. “There are no top-down mandates.”

You could look at it this way: The movement of the ’60s needed a big institutional structure to make things work—in part because of the limitations of the tech at the time. Now that kind of structure has come to seem vestigial. After Michael Brown was shot dead in Ferguson, Missouri, and the city became a lightning rod for activism, Mckesson says he had a kind of epiphany about movement-building: “We didn’t need institutions to do it,” he says. Social media could serve as a source of live, raw information. It could summon people to the streets and coordinate their movements in real time. And it could swiftly push back against spurious media narratives with the force of a few thousand retweets.

BIJAN STEPHEN (@bijanstephen) is an associate editor at the New Republic.



Of course, some level of institution-building is still crucial, as the movement has realized. And there are downsides to the media environment that today's activists have adapted to. Despite its success in making videos of police violence go viral, social media itself has become another arena where black people are abused. Harassment, threats, and insults are basic hazards of online activism today, but they are especially pervasive for anyone speaking on the touchy subject of race in America. Mckesson, for one, says he has blocked more than 15,000 people from interacting with him on Twitter. He retweets some of the haters. It's occasionally hard to read. (There's a stale, conventional wisdom that says overt racism is largely a thing of the past in America. Whoever says this clearly has not spent much time on Twitter. God help them if they start reading comments on YouTube.)

This might seem like an opportunity: Drawing hate out into the light was, after all, a signature tactic of the civil rights movement. Televised footage of well-dressed white people heckling black children as they walked to school were powerful because they were so public, says Lisa Nakamura, a professor of media and race at the University of Michigan. "But when that happens on Twitter, it's really, really private." Any given tweet might be public, but online threats are disembodied and anonymous. Bystanders don't seem to take them as seriously. Plus, the full experience of receiving a thousand threats may only really be felt by the recipient. Even in the panopticon of social media, mobs aren't all that visible.

And of course, social media is also profoundly susceptible to surveillance. We know now that many leaders of Black Lives Matter have been monitored by federal law enforcement agencies.

That has prompted many to start seeking out more secure channels; in nearly all my conversations with activists about how they use different platforms, there was a point when they told me they didn't want to say any more for security reasons.

Still, this movement, as diffuse and protean as it may seem, has mounted some of the most potent civil rights activism since the '60s. It helped secure the removal of the Confederate flag from the South Carolina capitol. It helped pressure the federal government to investigate police practices in Ferguson and Baltimore. It has successfully pushed Democratic presidential contenders to come forward with policy proposals on the issues that specifically concern black people in America. And an offshoot of the movement, a project called Campaign Zero that was organized in part by Mckesson, has put forward a bunch of specific policy proposals to uproot police violence. A huge reason for all this success is that, perhaps more than any other modern American protest movement, they've figured out how to marshal today's tools.

**The movement has changed the visceral experience of being black in America.**



## T

**The movement** has also had another profound but less concrete effect: I believe that Black Lives Matter has changed the visceral experience of being black in America. I see this in the way it has become a community reflex to record interactions with police—a habit that is empowering, even as it highlights black vulnerability. I see it in the rise of a new group of black public intellectuals and in the beginnings of a new political language. And I see it in my own experience.

I grew up in Tyler, Texas, a small city in the eastern part of the state, in the 2000s. I attended the local Catholic high school—not the local public school named after Robert E. Lee, where the majority of the student body was nonwhite. No one called me a nigger, though white friends would sometimes use the slur to refer to other black people; in the next breath, they'd assure me I was different. Despite constantly feeling like I was a token, or that I had to tiptoe around white sensitivities, I couldn't have told you what ailed me. I wasn't politically conscious. I didn't have the language to speak about microaggressions, aggression-aggressions, or structural prejudice. I just endured a thing I wasn't totally sure I was enduring.

But I can still remember the fluorescent lighting of my high school's hallways and the pervasive sense that something was deeply wrong. The air itself felt toxic. I had nightmares about nuclear reactors sending clouds of poison into the sky. On those nights I'd wake up and look through my window at the moon

and wonder how long it would be before I could escape.

Does it seem strange that I now associate those dreams with racism? That I see the unease I felt then as a species of profound alienation that I wasn't at all able to comprehend, because nothing I'd experienced before had prepared me to understand unthinking hate? This kind of clarity about my own experience has come with time and distance. I can't help but think that if I'd been a few years younger—if my upbringing in Tyler had overlapped with the past two years of digital and intellectual ferment in America—I would have realized far earlier that what I felt wasn't particularly unusual. "All of a sudden," Mckesson says, "you see that there's a community of people who share the same symptoms."

Of course, shared symptoms are not enough. That's why Black Lives Matter appears to be shifting into a new phase. "The movement doesn't win if there's only a small set of people who understand the solutions," Mckesson says. The movement wins when there's a broad understanding that we need a system that doesn't kill people, when a critical mass of citizens can envision what that looks like, and when concrete steps are taken to make it happen.

Historians of the 1960s talk about how the media of the time helped establish a "new common sense" about race in America. I think the new common sense being established now is that racism and the struggle against it do not exist somewhere in the distant past; racial activism didn't end after King and the Black Panther Party. Technology has helped make today's struggle feel both different from and continuous with the civil rights era. All the terror and greatness we associate with that moment is right in front of our faces, as near to us as our screens. **W**



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## The Hugo Awards

CONTINUED FROM PAGE 101

ballot—Best Novella, Best Short Story, Best Related Work, and Best Editors for Short and Long Form—voters choose “No Award.”

Earlier, Beale explained to me that his plan was a “Xanatos gambit”—“that’s where you set it up so that no matter what your enemy does, he loses and you win.” No surprise then, that in an email he sends after the awards ceremony, Beale is crowing. “The scorched-earth strategy being pursued by the SJWs in science fiction is evidence that we hold the initiative and we are winning,” he writes. The number of major categories in which no awards are given “demonstrates the extent to which science fiction has been politicized and degraded by their far left politics.”

But even as Beale vows to renew the fight, John Scalzi, a novelist and three-time Hugo winner who has been among Beale’s most outspoken opponents, says the prominence of writers like Jemisin proves the war is already over. “She stands on the shoulders of every other woman and minority and gay and lesbian and trans- or bisexual folk who had to put up with shit before,” he says. “She and lots of other people are now in a position where they can firmly plant their feet and say, ‘This is bullshit,’ and have a large number of people go, ‘You’re absolutely right.’”

Which brings us back, in a roundabout way, to Martin. He has attended almost every Worldcon since 1971 and has won four Hugos and lost 15, not counting any related to the HBO show. So Martin says he can say with utter sincerity that it is an honor merely to be nominated—not because the Hugo is a hoity-toity accolade bestowed by Ivy Leaguers, as the Puppies charge, but because of the caliber of past winners, men and women alike.

Martin, the son of a longshoreman, rejects the idea that anyone has been excluded from the Hugos for being too lowbrow or politically incorrect. But, he says, it’s not a popularity contest, either. “The reward for popularity is popularity! It’s truckloads of money! Do you need the trophy, too?” he asks. “Can’t the tro-

phy go to the guy who sells 5,000 copies but is doing something innovative?” Of course, that’s easy for someone of Martin’s stature—and success—to say. But it’s hard to argue with his lament about the hateful discourse and the name-calling that the Puppy-scuffle has prompted. At one point earlier this year, Martin was so despairing that he blogged that the Hugos had been broken. “I am not sure they can ever be repaired,” he wrote.

By the time he shows up in Spokane, however, Martin is more optimistic. Sanguine enough, in fact, to plan a Hugo Losers Party, a tradition he’d started back in 1976 but then let fall into other hands. Martin prints up invites—“Losers Welcome. Winners Will Be Mocked. No Assholes!”—hires a band and a caterer, and rents a 12,000-square-foot historic mansion. The party starts right after the Hugo ceremony ends, and winners who show up are required to don rubber cone-heads. Losers get magic markers to write on the cones.

After midnight, Martin takes to a balcony to announce that, for the first time, he will bestow his own awards—dubbed the Alfies in honor of Alfred Bester, whose book *The Demolished Man* won Best Novel at the first-ever Hugos in 1953. “This year all of us were losers,” Martin says, explaining that the Alfies, made at Martin’s expense from streamlined 1950s hood ornaments, are his attempt to take a little of the sting off.

Before the Losers Party hits full swing, Worldcon releases data that allows a look at a parallel universe where the Puppies hadn’t intervened. That lets Martin give trophies to the people who would have been on the ballot if not for all the barking, as well as some extra winners decided “by committee, and that committee is me,” Martin says. Sci-fi writer Eric Flint gets an Alfie for his “eloquence and rationality” in blog posts about the Puppy kerfuffle. Legendary author Robert Silverberg, who has attended every Worldcon since 1953, receives an Alfie just for being himself.

The biggest cheers, though, break out when Martin honors Annie Bellet and Marko Kloos. The new data show Bellet would likely have been on the ballot even without the Puppy slates; the Alfie clearly stuns her. In her acceptance speech she says she wants the Hugos to “be about the fiction. And that was important enough to me to give one up.”

By turning down his Puppy-powered nomination, Kloos had made room on the ballot for the winner, Cixin Liu’s *The Three-Body Problem*. Kloos tells me he was thrilled to have played even a small part in honoring the novel, and earlier in the evening he’d posed for photos with the book’s translator. Now, standing on the balcony with Martin, Kloos grips his hood ornament and grins broadly. “I may get nominated again,” he tells the partygoers. “But knowing why I got this and who gave it to me—tonight, this beats the shit out of that rocket.” ▀

## COLOPHON

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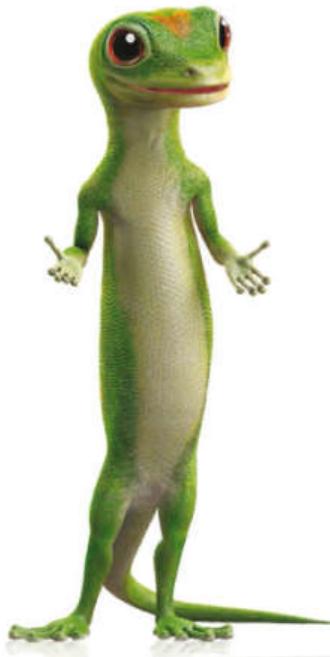
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The FCC is trying to soothe your ears with something called the CALM Act, which passed in 2010. It requires commercials to match the average volume of the shows during which they're playing. The FCC also sets a legal limit to how loud shows can get, but there's a catch. Shows mix loud and soft parts: One character whispers, while another one shouts.

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# Billie Jean King

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“King won 39 grand-slam titles, including a record 20 career titles at Wimbledon. She won a so-called battle-of-the-sexes match against Bobby Riggs in 1979.

When I was 11, my friend Susan Williams took me to her coun-

try club. That's where I first played tennis. And I said to myself, "I'm not going to be able to play much, because we don't have the financial means." But not long after that, I found out that the city offered free lessons in the public parks. That's when I went home and told my parents I wanted a racket. ¶ When I was 12, I started to play tournaments. I real-

ized everybody in my sport wore white socks, white shoes, white clothes, and played with white balls—and everybody who played was white. I didn't like it. I asked myself, where is everybody else? I went to Long Beach

Poly High School. It was very diverse. So I didn't like that the sport of tennis was so white. That was my epiphany. I promised myself I would fight for equal rights and equal opportunities for boys and girls for the rest of my life. ¶ In

my own little 12-year-old way, I knew I could use tennis for that. I knew it was a platform and an opportunity, because people would notice me. Arthur Ashe and I were born the same year, and I think there was something about being born in that time, at least for tennis. We just dug in with the social justice. My generation fought very hard to get representation at the table. ¶ The kids today expect everyone to have a place at the table. They walk in and say: "You're all going to talk. Everybody has a voice." If there's a problem, they get their computers out and their phones out and say, "Let's go. We're going to solve this." —As told to Jessi Hempel

 Nigel Parry





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